
Moving Toward Agency

How Technology of the Self can Liberate Humans from the Social Constraints of Biological Sex.

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Abstract

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Gendered norms limit human potential. Defined by their biological sex, people tend to adhere to social and cultural norms established by the patriarchal institution, which defines their abilities and attributes unequally.

Using speculative design, foresight methodologies and the feminist framework for game design, my research speculates, through a feminist lens, on the question, "What if our lives could be conducted as if they were free of gender limitations?"

Historically, technology has challenged the definitions of biological sex and gender, through the use of body modifications, and chemical and hormonal modification. Therefore, the use of technologies has potential to offer agency to individuals by transfiguring gender definitions and social limitations.

My practice focuses on creating a personal game - Neutrois: an interactive novel which features original artwork, with a playable experiential future scenario. The game helps players envision a postgender world and engages to think critically about current and future social constraints.

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Chapter 1: Introduction

In a circle of intersecting solipsisms, I use my imagination to conceive of someone else
and then of the imagination of that person, in which I find myself reflected.

—N. Katherine Hayles

As a former professional Thai boxer, I was exposed during my adolescence through my adult life to the ongoing criticism of being a young woman engaged in a masculine sport. Criticism referring to my external appearance; my physical strength; and to the fact that practicing this sport could impair my ability to conceive and be a mother, as if this was the natural course of life for every woman.

My research takes place amid all these stereotypes and assumptions, and why it is significant to me. I believe that our biological sex and gender identity should not define our identity, capabilities, or our potential.

My thesis involves a critical discussion of social norms related to sex and gender. I consider my work to be instructive, aiming to stimulate discussion of a possible future in which gender and biological characteristics and definitions are a matter of choice.

Inspired by the postgenderism movement and by cyberfeminist ideology, the intent of this thesis is to speculate on a future scenario, written through a feminist lens, to help envision the possibility of technologies of the self—a group of technologies designed to enhance the human

body—to be used to liberate humans from the restrictive paradigms of gender norms in the next 50 years.

In the context of my work, it is important to acknowledge that when trying to (re)imagine the future there are no certainties; every future scenario must be considered fiction to some extent. As described in Voros's cone of plausibility model, which is based on prior work by Mintzberg, Horton and Slaughter (Voros 10), future narratives are used to describe one's desired future which might inspire change.

The narrative I created describes an idealistic future world in which an individual is defined in relation to itself and not in relation to another. The goal of abolishing relativity is a determining factor. The narrative I have chosen to present is one of six narratives I have written (included in the appendix) that vary based on the worlds they describe—moving on the range between male superiority over women, a world of mixed genders with equal rights, status, and opportunity, and a postgender world.

It is important to consider the ambiguity of the future narrative I describe in the game. Although I consider it to be a representation of a utopic future, from a feminist point of view, it might be interpreted as a dystopic future, from a critical point of view addressing the use of technologies that interfere with the human body, considering issues such as privacy, control, and technology bias.

I chose to frame my scenarios with a 50-year time horizon for three reasons. First, this time

span gave me the option to consider the development and accessibility of certain technologies. Second, the 50-year time frame allowed me to move beyond the conventional, and extend my creativity and imagination in envisioning the future. And third, based on the “Global Gender Gap Report 2018” by the World Economic Forum, the process of moving toward an equivalent society is very slow, and women are not likely to get parity at this rate within the next 50 years.

My thesis is triggered by the *What-if* question: “What if our lives could be conducted as if they were free of gender limitations?” It integrates speculative design and foresight methodologies with a feminist framework for game design to answer the following research questions:

- How might we use technologies of the self to reconsider agency over the next two generations (50 years)?
- How might we use future scenarios to stimulate a shift in participants’ awareness of the social values related to gendered behaviour?

In the context of my research, it is important to clarify some of the key terms I am using in my paper. By pre-defining some of these broad concepts, I can contribute to the understanding of the main ideas I explore in this paper.

It is necessary to differentiate the two often misused terms *biological sex* and *gender*.

Biological sex, also known as assigned sex, is assessed by hormone levels, chromosomes, genitals, and other physical features—dividing the majority of people based on a binary system of male or female, and also considering intersex (including both binary sexes’ characteristics).

Gender defines individuals depending on social or cultural factors such as social role, position,

behaviour or identity. Theories of gender are based on the claims that behavioral and psychological differences have social rather than biological causes. These differences that we accept, often referred to as gender stereotypes, represent a learning process of one's acceptance of gender norms. The separation between the concepts of sex and gender allow gender theoreticians to explain the feeling of being "trapped in the wrong bodies," plus the fact that biological sex and gender identity do not always match, which has been used to support transsexuality and gender normativity theories (Mikkola).

Although my work aims to speculate on the future of gender I chose to frame my research with the feminist call to action, which strives for liberation and equity. I find that the term *gender equality* problematic in the context of my work, as it ignores many aspects of the issues women deal with. The campaign for gender equality—under the wide umbrella of the patriarchal ideology—still places women in a position *relative* to men, which is one of the things I'm trying to overcome in my future scenario.

Feminist theory is very broad and complex and can refer to many different viewpoints and aims. In my work, I am using the most profound definition of feminism—acting for liberating women from the restricting chains of the patriarchal ideology—as described by Kimberlé Williams Crenshaw, who identifies oppression as a common experience for women globally, but also considers the individual's background to discuss the uniqueness of needs and experiences (2).

As a 42-year-old, heterosexual, white feminist, who aligns herself with the potential of cyberfeminism ideology, I engage with these theories as part of my work. **Cyberfeminism**

ideology grounds itself in cyberspace and new-media technologies. Its root ideas involve freedom from social constructs such as gender, sex difference and race, and women's empowerment in cyberspace (Consalvo 108-109).

I acknowledge that the cyberfeminist theories are considered to be historical in the context of my work, and are criticized for requiring economic privilege. However, as a feminist game designer, I find them relevant for my work as they represent one the way in which women may use technology to promote their agenda and express their individuality.

Cyberfeminist theories have been explored through the work of Judy Wajcman, Donna Haraway, and N. Katherine Hayles. Haraway and Hayles also lean on liberal humanism and posthumanism theories as a way to reflect on the idea of individualism: "the idea that subjects are individuals first and foremost because they own themselves" (Hayles, "Liberal Subjectivity Imperiled: Norbert Wiener and Cybernetic Anxiety" 145).

Addressing my research through a feminist lens allows me as a researcher to move beyond the "relative" identification of women. It pushes the boundaries beyond being equal to men to being free entities with a strong notion of self and sets the ground for the agency I am seeking to achieve. The sense of relativity has been described in a fascinating way by Sherry B. Ortner in "Is Female to Male as Nature Is to Culture?" Ortner identify women as "nature" and men as "culture" (72), an explanation for the superiority of men over women.

In relation to women's liberation, I recognize the wide-branched system of **patriarchal ideology**. However, I chose to focus on the one aspect bound to biological sex and reproductive roles established by the patriarchy: depicting women with roles related to their femininity such as pregnancy, childbirth, and motherhood, which are considered social norms.

With my work, I am aiming to undermine the complex aspects of ***female oppression***.

The universality of female subordination, the fact that it exists within every type of social and economic arrangement and in societies of every degree of complexity, indicates to me that we are up against something very profound, very stubborn, something we cannot rout out simply by rearranging a few tasks and roles in the social system, or even by reordering the whole economic structure (Ortner 68).

I am aiming not only to indicate the reason for female oppression but also to offer possible solutions, inspired by technologies which examine the relationship between the body and technology, and are inspired by that relationship.

The term ***human agency*** originated from the philosophical discipline, and has been studied as part of action theory by Hegel and Marx. In her article, "The Concept of Agency: A Feminist Poststructuralist Analysis," Bronwyn Davis, a feminist theorist and an independent scholar, clarifies the term: ". . . agency is synonymous with being a person. It is used interchangeably with such concepts as freedom, autonomy, rationality and moral authority . . ." (42). In feminist discourse, agency is an important concept in aiming for women's emancipation; it places

emphasis on issues such as resistance, empowerment, and the oppressive social structure—the patriarchal society and “. . . its non-occupation in another” (42).

The term *technologies of the self* comes from Michel Foucault, who describes this group of technologies associated with their ability to “permit individuals to effect by their own means” (Foucault 16). In a similar way, Rocci Luppigini uses the term *Technoself* to describe “the evolving configurations of human-technological relationships that continually shape the human condition and what it means to be a human being” (2). In my preferred future scenario, I focused on neurotechnology, biotechnology and reproductive technology, as tools to help humans live to their full potential—agency.

In their article, “Postgenderism: Beyond the Gender Binary,” Hughes and Dvorsky define **postgenderism** as:

. . . an extrapolation of ways that technology is eroding the biological, psychological and social role of gender and an argument for why the erosion of binary gender will be liberatory. Postgenderists argue that gender is an arbitrary and unnecessary limitation on human potential, and foresee the elimination of involuntary biological and psychological gendering in the human species through the application of neurotechnology, biotechnology and reproductive technologies (1).

As a research practice I created a personal digital game *Neutrois*—a nonlinear interactive novel speculating on life in a postgender world—embracing critical future thinking. This approach was inspired by research on games as “a method for popularising and demystifying futures” (Candy

234). Games can serve as a medium for demonstrating ideas that might contribute to inspiring a real change in social values. The goal was to raise game players' awareness of the limitations that gender norms place on our potential for agency.

I chose to position my game under the category of personal games. As an interdisciplinary project, my game combines a feminist framework for game design with a foresight scenario. As such, I consider my game to be a representation of my ideology and beliefs by creating a narrative which promotes agency as its main value. I was involved in every aspect of the game creation: design, coding, writing, and illustrating “. . . the maker uses her hands to build her game and is involved in all aspects of creation” (Westecott 202). In addition, I used Twine, a tool originally designed for writers to create games, which is also a platform for creating personal games.

It is important for me to identify my game as a feminist game to subvert common gender archetypes. Some of the popular digital games created in the last thirty years represented common gender stereotypes, classified men with a masculine and competitive character while associating women with being “helpless and sexually provocative” (Fisher 553).

The second chapter is a literature review of the feminist, postgenderism, and foresight theories used to support my argument that the liberation of women from gender roles is not possible within current social and cultural values. I will use postgender theories, focusing on the promise of postgenderism and cyborg theories, to demonstrate how, by blurring binary biological sex with the help of technology, humans might release themselves from restricted gender norms.

In my research, I stress the importance of using future scenarios as a critical approach to strive for an essential change in our social and cultural gender norms. I will examine the work of Kember, Wheturangi, Skawennati, Durie, and Simpson to discuss the importance of creating an inclusive future; and the use of scenarios among African-Americans, Indigenous Peoples, and women—social groups that are often neglected and not considered as part of the future—as a legitimate medium to present the voice of the *other* and inspire change.

The *third chapter is a review and reflection of the methodologies, methods, and techniques* I used in my research. The thesis combines speculative design (based on art and design disciplines), foresight methodologies (used for future scenario development), and a feminist framework for game design. These approaches helped address my research question, frame the scope of my work, and provide the right tools to explore and reflect on the *What if* question through a narrative presented in the interactive novel, and shifts to social construction and critical play.

The *fourth chapter describes my explorations*. It includes the list of trends and drivers I created as part of the analysis and synthesis phase of the scenario writing, the final scenario that is based on science fictioning, and the early stages of prototyping. As part of my exploration I created an extended list of trends and drivers and practiced with different methodologies—utopian and dystopian—for scenario writing, which are included as part of the appendix.

The *fifth chapter reveals the final work and reflection* through the process of its last two iterations. It is also a reflection on the learning process related to creating the prototype. It is also where my research and practice intersect through a combination of a few theories, methodologies, and frameworks:

- I combined scenario development (foresight methodology) with a suggested feminist game design framework, and postgenderism and feminist technology theories to develop the game narrative. I focused on challenging traditional norms set by patriarchy, and the biased use of pronouns.
- I used cyberfeminism and postgenderism theories to describe the way technologies are being used to overcome gender and create a new social order based on values of equality and self-expression. These theories come together through the narrative and the concept of the artwork I chose to include in my work.
- I used feminist ideology for women's liberation as a means to assert an equal and inclusive future as described in the future scenario I chose to include in the narrative.

The *last chapter is the conclusion* of both my research and my practice, a self-reflection, and possible future developments of this project.

I hope that this research project inspires game players and raises their awareness of the limitations that gender norms have on our potential for agency. I hope it will contribute to the growing field of social values games studies and also contribute to the framework of incorporating future scenarios into games.

Chapter 2: Literature Review of Theoretical Framework: Feminism, Postgenderism and Technology

Overview

What will the future of gender hold, and will humanity be able to expand beyond gender limitations? These were the two questions that led me to my research. In “The Global Gender Gap Report,” the World Economic Forum includes a prediction showing that, based on the current rate of change, it will take humanity 100 to 217 years (viii) to achieve gender equality, “the relative gaps between women and men across four key areas: health, education, economy and politics” (The World Economic Forum vii).

Although the general trend shows progression toward equality, there are indications of regression and inhibition. Access to digital technology such as the internet is not equally distributed, and affects the advancement of less developed countries (Women and the Web 4). Moreover, in their last report, “Breaking Down Gender Barriers to Build the Future Tech Workforce,” Information Systems Audit and Control Association (ISACA) points out a decrease in the number of women in technology, particularly in key positions (3). According to the report, women make up 40-59 percent of the world’s workforce; yet the technology field is “notoriously male-dominated at all levels” (2).

My literature review combines theories from three different disciplines, including Feminist Theory, Postgender Theory, and Foresight Theory, in order to construct a fertile ground for writing speculative future scenarios about a postgender world.

I focus on clarifying the concept of agency as a means to women's liberation. Feminist theoreticians such as Diana Meyers, Sherry Ortner, Shulamith Firestone, Simone De Beauvoir, Ti-Grace Atkinson and more, argue that true liberation from patriarchal values can never be achieved unless women liberate themselves from the sexual and reproductive roles associated with their biological sex, established by patriarchal values and which contribute to women's oppression. I then present one obstacle to women's liberation—the idea of relativity, and some of the underlying views on sex, sexuality, and reproduction roles assigned to women by patriarchal systems. Although patriarchy, as a social system based on domination, embraces a variety of social, legal, political, religious, and economic organization, in my literature review, I focus on how the patriarchy is connected to sex and roles of reproduction.

In the second part of my literature review, I focus on one possible solution to women's liberation through a review of cyberfeminism and postgenderism, brought together to strive for deep social change. My work speculating on how technologies of the self, a term set by Michel Foucault to describe a group of technologies that allows individuals to establish their sense of self, might help to overcome gender. I am particularly interested in exploring the body-technology connection through a feminist lens, to make a critical review of the technologies we use, and on their abilities to overcome sex, sexuality, and gender.

Part of my literature review explores the potential of postgenderism technologies as categorized by Hughes and Dvorsky, including reproduction, sex reassignment, neurotechnologies, chemical technology, virtual bodies, and Artificial Intelligence (AI), which can be used as mechanisms for such change. I review, using cyberfeminism, cyborg, and postgenderism theories, the implications of these technologies on the human body from two aspects:

- Technology designed to be closer to our bodies, affecting noticeable changes in our appearance and interfering with their biological and chemical processes.
- The feasibility of a change: The intersection of new technologies designed to enhance the human body with the philosophy of postgenderism allows for a deeper discussion of the potential of new technologies to enable women's emancipation when they drive deeper social change.

In my research, I studied various feminist theories and approaches across a broad timeline. Studying a wide range of approaches provided me with a comprehensive list of trends and drivers, which I used as background for writing scenarios that portray a more inclusive future. Moreover, I follow Kimberlé Williams Crenshaw argument that an investigation of the 'multiple grounds of identity' will allow for a deeper understanding of how the sociological world is structured and what challenges feminism has to deal with (2).

Feminist Approaches to Agency

Modern philosophy in the West encourages the individual moral and political consciousness to recognize the self as a free and rational entity—an autonomous agent. However, feminist

philosophers such as Meyers have argued that “these modernist views are both incomplete and fundamentally misleading” and that from a critical point of view we must question “[w]ho models this free, rational self?” (Willett, Anderson, and Meyers)

There is a vast and diverse range of feminist work touching on the definition of self. Women are defined in relation to the *other*—men—often presented as “[t]o be the Other is to be the non-subject, the non-person, the non-agent” (Willett, Anderson, and Meyers). I am interested in Meyers’ views of how these modern philosophy approaches support the family, friendship, passionate love, and community, while reinforcing a binary system that divides social space into autonomous agents on the one hand and their dependents on the other. While women are no longer considered to be less capable than men, these perceptions transcend the many, sometimes fractious, sources of social identity at intersections of sex, sexual orientation, race, class, age, ethnic origin, and so on (Meyers 23).

In a similar way, De Beauvoir describes the woman as “a passive object” (306) an “inert given object,” (306) who experiences her life through the need to please others. Through many of the traditional roles women take on themselves—daughter, wife, mother, prostitute (289-305)—she claims that none of them are biological or hormonal by nature. The acceptance of these roles symbolizes the beginning of the way in which a woman accepts her body as an object for another’s gaze, something which has its origin not in anatomy but in “education and surroundings” (307). The role of the *other* was the role assigned to her by males.

Sherry B. Ortner reviews biological determinism as a common justification of the “universal devaluation of women” (71). Ortner reflects on the biological differences between male, (identified under the category of “culture”) and female (identified under the category of “nature”), and criticizes the assumption that females can “maximize maternal pleasures, which to them are the most satisfying experiences of life. . . [and] in general quite satisfied with their position” (71). In other words, females are associated with their biological role of reproduction and motherhood, which creates the perception of their inferiority to males.

The female condition is in a state of constant conflict. Although some females might recognize male-dominated culture as their reality, others might not; and as result, some reject male dominance as absolute. This situation of self-alienation and constant cognitive contradiction embodies the struggle of being a woman. The social meaning of a woman's body is based on its essence—a non-man—a relative creature, who experiences her body as an object for another's gaze.

Influential film theorist Laura Mulvey engages psychoanalysis to explore the notion of the gaze, and describes it as a fantasy of the female styled by males:

The determining male gaze projects its phantasy on to the female figure which is styled accordingly. In their traditional exhibitionist role women are simultaneously looked at and displayed, with their appearance coded for strong visual and erotic impact so that they can be said to connote to-be-looked-at-ness. (837)

According to Mulvey, the female is portrayed in films as a “sexual object . . . she holds the look, plays to and signifies male desire” (837). As a result, De Beauvoir claims that females cannot be defined in an objective way, “. . . and her mystery conceals nothing but emptiness” (De Beauvoir 320).

The search for agency in Black and Indigenous feminism, lies in the intersectionality of oppression and other issues they are dealing as minority groups. Black Feminism deals not only with control and oppression but also with struggles with “resistance, activism and politics of empowerment” (Minoo 2334). Alinia Minoo, who studies race and racism, nationalism, and gender and violence, observes that the struggle against oppression can take place as an individual and as a group, emphasizing the unique difficulties black women face as an individual agency (Minoo 2334).

In a similar way, Indigenous feminism examines “agency against the background of colonial histories and Eurocentric hierarchies” (Moura-Kocoglu 242). Indigenous feminism “acknowledges the diversity of situated knowledge, cultures, herstories, and epistemologies” (Moura-Kocoglu 244), while analyzing women’s social, cultural, and economic oppression influenced by colonialism (Moura-Kocoglu 241). Although some Indigenous societies were matriarchal, matrilineal, and/or matrilineal, prior to colonialism, it is quite possible that they “experience a multitude of layers of inequality, their lives are constituted by a web of relations of domination and subordination, privilege, and agency” (Moura-Kocoglu 242).

Despite the above statements, it is conceivable to use a critical approach to describe a future in which an egalitarian society and the emancipation of women are part of the reality of our lives. The possible future scenario should be used as “critiquing the social space around us” (Simpson 34) as a way to challenge and critique norms that affected our life (Simpson 34–35). Imagination of the future has been used, as I will elaborate later in this chapter, as inspiration for future possibilities. I intend to use Simpson’s claim to stress the need for manifesting the future I envision.

Sex, Sexuality and Reproduction as a Means for Women’s Liberation

Having established the need for a reconsideration of the historically gendered self-notion, I will now consider ways in which a new model might manifest.

Patriarchy often cites biological difference, described also as “sexual asymmetry” (Lerner 16), as a rationale for assigning specific gender roles to women and men. A woman’s role is often based on “the evidence of its ‘naturalness’” (Lerner 16), referring to women’s biological abilities of pregnancy and giving birth. Moreover, the “masculine” and “feminine” sex roles are so deeply integrated in our social structures, affecting the perception of accepted behavior and “can easily become self-fulfilling prophecies” (Lowe 39).

The feminist movement has managed, to some extent, to reduce male dominance, mainly in Western culture, with the help of “Juridical equality, weapons and the police,” and to impair

patriarchal values, reduce the determinative power of males, and weaken the “heritage of patriarchal power, culture and thought” (Hughes and Dvorsky 2).

Socialist feminists have indicated that the transition toward an industrial society improved the potential for gender egalitarianism. Prior to industrialization, during agricultural production women mostly fulfilled the domestic role of mothers, raising the next generation of farmers, while husbands and sons mostly fulfilled the roles of power, working the fields (Hughes and Dvorsky 8). The changes in women’s roles, accelerated in the post-industrial society of the last thirty years in the West, have positioned them as if they were equals in their families and workplaces (Plant 38-39). However, Marxist feminists argue that women are oppressed through systems of capitalism and private property, and that female liberation cannot be achieved as long as much of women’s labour—housework, for example—is uncompensated (Desai 119).

Socialist-feminist Shulamith Firestone discusses a possible solution, arguing that “The end goal of feminist revolution must be, unlike that of the first feminist movement, not just the elimination of male privilege but of the sex distinction itself: genital differences between human beings would no longer matter culturally” (11). She supports her argument by explaining that “The heart of women’s oppression is her childbearing and child-rearing roles” (12). The decline of male control over pregnancy, due to the use of contraception and abortion, freed women from being constrained by childbearing and allowed them to act by their right to choose with regard to their gender role—birth and motherhood.

. . . elimination of sexual classes requires the revolt of the underclass (women) and the seizure of control of reproduction: not only the full restoration to women of ownership of their own bodies, but also their (temporary) seizure of control of human fertility—the new population biology as well as all the social institutions of child-bearing and child-rearing.
(11)

Radical feminist Andrea Dworkin has written about the heterosexual sexual relationship in her book *Intercourse*. Dworkin uses the term *occupation* to describe the “hostility or anger as well as dominance” of males over females.

Intercourse is frequently performed compulsively; and intercourse frequently requires as a precondition for male performance the objectification of the female partner. She has to look a certain way, be a certain type—even conform to preordained behaviors and scripts—for the man to want to have intercourse and also for the man to be able to have intercourse. The woman cannot exist before or during the act as a fully realized, existentially alive individual. (Dworkin)

Dworkin asserts that intercourse is a male-centric experience because our society identifies it with male supremacy. As such, rape and offensive and abusive sexuality toward women are often strongly defended and culturally excused.

In an attempt to trace a possible solution for women’s liberation, the cyborg theory as discussed by many theoreticians such as Haraway, Hayles, and Parkhurst argues for the use of technology as a means to overcome gender as a limitation of human potential. The focus is on

the cyborg, “a hybrid of machine and organism” as a “creature in a post-gender world” (Haraway 3). Technology, among other changes, might help to blur the boundaries between the binary biological sex and also transform the gender roles associated with our biological bodies.

Similarly, a fascinating manifesto, *XENOFEMINISM A Politics for Alienation*, written by the xenofeminist collective Laboria Cuboniks, reflects on the idea of women’s liberation through the use of science and technology. Macon Holt describes the manifesto as a way

. . . to explore the intersection of technomaterialism (technology as it relates bodies and the world), anti-Naturalism (the critique of the tendency to replace the god figure with nature), and gender abolitionism (a “shorthand for the ambition to construct a society where traits currently assembled under the rubric of gender, no longer furnish a grid for the asymmetric operation of power” (0x0E)). (Holt)

Motivated by the “frustration at the impediments placed on reason by the functioning of gender under patriarchy, and a simultaneous frustration with what they consider to be the reluctance of many contemporary feminisms to deal with the “abstract complexity” of the contemporary world,” (Holt) Xenofeminism stresses the need for a change “In the name of feminism, ‘Nature’ shall no longer be a refuge of injustice, or a basis for any political justification whatsoever! If nature is unjust, change nature!” (0x1A).

Moreover, Hughes and Dvorsky argue that declining the binary definition of biological sex will undermine social heteronormative values and, as a result, humans will be able to liberate

themselves from the social constraints related to their biological sex. Considering technology as one means for the erosion of biological sex, Hughes and Dvorsky claim that

Technological progress is ameliorating these gender differences, but only the blurring and erosion of biological sex, of the gendering of the brain, and of binary social roles by emerging technologies will enable individuals to access all human potentials and experiences regardless of their born sex or assumed gender. (8)

Early arguments for the erosion of biological sex as a way to deconstruct gender surfaced among various European avant-garde movements in the first half of the twentieth century, especially in the Italian futurism movement: Valentine and Marinetti envision the future human as a subjective being, neither man nor woman, who challenges our understanding and norm, of what man and woman are. Their main claim is that eros is the most “transgressive force” (Re 11) and by becoming aware of this and acting to liberate themselves from its hold, both men and women will eventually adjust “to new forms of individuality which are defined neither by gender nor by the singularity and continuity of consciousness” (Re 11).

Michel Foucault’s theories from 1978 on the social construct of sex and gender say that pre-modern societies did not even have the concept of gay and straight; they simply sanctioned or forbade acts without any idea that the acts implied anything about a person’s “orientation.”

Donna Haraway, a socialist-feminist, criticized binary definitions and ecofeminism in her 1984 essay “A Manifesto for Cyborgs: Science, Technology, and Socialist Feminism in the 1980s.”

Haraway argued that by integrating women and machines into a new creature—the cyborg—we can see the erosion of patriarchal and capitalist values. Hughes and Dvorsky recount Peter

Singer's argument in *A Darwinian Left: Politics, Evolution, and Cooperation*, contending that human nature is rooted in hierarchy and selfishness, which are the basis of our gender social norms. Singer urges the use of new genetic and neurological science to overcome these basic characteristics, which are the cause of the most profound conflict and competition between binary sexes (7).

Postgenderism and Technology

Technologies of the Self

Technology, with its wide range of possibilities, is designed for many purposes to contribute to the development of humankind. As part of his work researching the rules, duties, and prohibitions of sexuality, Michel Foucault identified four types of technologies based on their purposes: production, sign system, power, and self. Each type of technology "implies certain modes of training and modification of individuals, not only in the obvious sense of acquiring certain skills but also in the sense of acquiring certain attitudes" (Foucault 17-18).

I am especially interested in the fourth category, the technology of the self, as it allows "individuals to effect by their own means," and to "transform themselves in order to attain a certain state of happiness, purity, wisdom, perfection, or immortality" (Foucault 18), which I consider equivalent to the idea of the agency of the individual—the ability to define the self according to one's desires. Although the third category, power, also relates in a way to the

human body, Foucault address it from a perspective of “domination, an objectivizing of the subject”, and as such it is not suitable for the context of my work.

Katherine Hayles uses the phrase “technologies of the body” to describe a group of technologies that are designed to be incorporated with the human body. However, unlike Foucault, Hayles does not relate specifically to technologies which might contribute to the empowerment of human nature. As such I tend to find Foucault’s definition to be more precise in the context of my work.

Feminist Technology and Cyborg Theories

Industrial technology may have had a patriarchal character, but digital technologies, based on brain rather than brawn, on networks rather than hierarchy, herald a new relationship between women and machines. (Wajcman 147)

My interest in Judy Wajcman’s feminist viewpoint on technology addresses the reflective approach of the cultures and practices associated with technologies. Some feminist theorists of technology emphasize “the role of technology in reproducing patriarchy” (144). An initial challenge for feminists was to show how gender stereotypes are inherent in technologies by differentiating the male-oriented machinery such as heavy industrial machines and weapons and female-oriented home and assistance technologies (144). For many years technology and engineering were exclusively dominated by “. . . a white, male middle-class profession that ‘male machines rather than female fabrics’” (144). Feminist theories of technology identified the ways

in which socio-technical relations manifest not only in physical objects and institutions but also in symbols, language, and identities (144).

The labour market in the fields of technology and science is characterized by inequality stemming from

human capital, domestic responsibilities that fall disproportionately on women, and employment discrimination. . . .in the new knowledge economy, men continue to dominate technical work . . . This is not to say that all women reject 'geek culture', nor that computer science is universally coded as masculine . . . However, entering technical domains requires women to sacrifice major aspects of their feminine identity. . . for a masculine version, whilst there is no similar 'degendering' process prescribed for men. (Wajcman 145)

The implication of this is that women are deprived of the processes of design and development of future technologies that shape the world in which we live. Moreover, Wajcman claims that

Gender is integral to this sociotechnical process: that the materiality of technology affords or inhibits the doing of particular gender power relations. Women's identities, needs and priorities are configured together with digital technologies. For all the diversity of feminist voices, feminist scholars share a concern with the hierarchical divisions marking relations between men and women. (Wajcman 149)

Current feminist approaches to technology stress the potential of information and communication technologies (ICTs) to empower women. They see "digital and biomedical

technologies as offering possibilities for destabilising conventional gender differences” (Wajcman 144). As cited in Wajcman’s text, Sadie Plant, a cyberfeminist, talks about the potential of digital technology to blur the boundaries between male and female, “enabling their users to choose their disguises and assume alternative identities” (Wajcman 147).

In a similar way, Donna Haraway advocates for a change in the female-technology relationship through its tangible representation: the cyborg. This new entity, which is based on biotechnology, reproductive technology, genetic modification, and virtual reality, fundamentally challenges traditional notions of gender identity. When relating to the cyborg as a postgender entity, Haraway describes the change in technologies, which are moving away from a representation of the male interest to a reflection of the self, claiming that

. . . basically machines were not self-moving, self-designing, autonomous. They could not achieve man’s dream, only mock it. They were not man, an author to himself, but only a caricature of that masculinist reproductive dream. To think they were otherwise was paranoid. Now we are not so sure. Late twentieth-century machines have made thoroughly ambiguous the difference between natural and artificial, mind and body, self-developing and externally designed, and many other distinctions that used to apply to organisms and machines. (152)

In relation to that matter, it is important to acknowledge the two challenges identified by cyberfeminism: technology bias and women’s access to technology. Judy Wajcman addresses these two issues, claiming that technology bias embraces the principle that the entire process of designing and developing new technologies contains inherent bias as it is influenced by social

and cultural values, as well as by the normative force that defines them—patriarchy. Wajcman also pointing to the fact that “The capacity of women users to produce new, advantageous readings of artefacts is dependent on their broader economic and social circumstances” (Wajcman 149).

The shift in the essence of technologies provides an opportunity to reexamine the female-technology relationship. The technologies reviewed in the Haraway manifesto, which relate to the human body, indicate a potential to influence a postgender world.

Postgenderism Ideology

Transhumanism suggests the improvement of humanity’s biological condition to overcome its limitations by using technologies such as neuroscience, robotics, nanotechnology, biotechnology, and other body-related technologies (Cruz 917). As transhumanism sees aging as a form of a disease, postgenderism sees gender as an inhibitor of human potential (Dvorsky). Transhumanistic theory has strong feminist ideology integrated into it, as it represents the “desires, hopes, and aspirations of liberation” (Ostler).

Postgenderism is a derivative of the transhumanism movement, focusing on the technology, especially biological and reproductive technology, to disintegrate binary gender roles to help create a postgender society (Johnson and Repta). “Postgenderists argue that gender is an arbitrary and unnecessary limitation on human potential, and foresee the elimination of involuntary biological and psychological gendering in the human species through the application of neurotechnology, biotechnology and reproductive technologies” (Hughes and Dvorsky 1).

Transhumanism adds another dimension to the posthuman theory and to the debate on the future of humanity, and focusing on the integration of technology as a means of realizing change. Transhumanism is where “technologies are seen to evolve along with the human and cannot be separated from our evolution as they have become a part of defining being human” (Bailey).

In contrast to posthumanism, which is commonly defined in the literature as “a term that is typically employed in cultural studies and marked by a postmodernistic mood,” transhumanism (a subset of posthumanism) concentrates several currents such as extropianism, singularitarianism, immortalism, postgenderism, and technogaianism, all of which share the agenda of the improvement in the human biological condition through advanced technologies (Cruz 917).

In a similar way, postgender, a term frequently used to describe a future condition in which restricting gender roles are dismissed as a means of liberating women from patriarchy, is not necessarily referring to the use of technology, but more to the social-cultural aspects of posthumanity (Bailey).

The first signs of postgenderism began to form gradually in the 1970s, while social constructionist feminists and sex radicals were encouraging the breakage of the binary. In 1971, Shulamith Firestone spoke out in favour of the artificial womb as a means to undermine the patriarchal gender values. Sandra Bem, in 1974, recognized the dangers inherent in gender and

introduced *androgynous range* as a solution to the gender problem. In the 1980s and 1990s, transgender people began breaking the gender binary, using technology to break down sex characteristics of their bodies. In 1990, Judith Butler urged feminism to release the biological body from the destiny imposed by heterosexuality, claiming that feminists should act to break the connection between “biological sex, performative gender, and heterosexual desire” (Hughes and Dvorsky 7). In 1994, Kate Bornstein called for the complete abolition of gender by law. Today’s transgender movement continues to break the gender binary by supporting postgender approaches and using terms such as pansexual, omnisexual, and neutral pronouns such as *ze*, *per*, and *zir* (Hughes and Dvorsky 6-7).

At the beginning of the twenty-first century, discourse on the binary appeal intensified when the use of technology became deliberate in order to transcend the limits of the human body and move beyond the definitions of binary gender. Science fiction writers such as Ursula K. Le Guin, Greg Egan, and the popular television show “Star Trek” have described a postgender future by using neutral pronouns, neutral entities, or third gender, and encouraged discussion about the reconsideration of social values related to gender roles and their limitations on the human condition.

Postgender Technology

Background

Measures such as birth control pills, abortion, or a change in social norms allow women the freedom to choose to live their lives unmarried and to free themselves from childbearing. Social

norms also acknowledge women as sexual creatures, equal to men. Reproductive technologies enable women to dismiss gender expectations by allowing them to focus on careers without being committed to the biological deadline of fertility. These technologies do not eliminate women's gender obligations, but they do allow them freedom and social recognition that is not defined by sex and gender.

The medical procedures for sex changes and transsexualism are mostly based on the gender binary. This need arises mainly because of a dichotomous gender system that dominates the field of medicine, that dictates the criteria for diagnosis and treatment, and attempts to adapt sex changes to normative social processes. "At the same time, this criterion and the version of transsexuality that it posits produce and repeat a fiction of normal, that works as a regulatory measure for the gender expression of all people" (Hughes and Dvorsky 6-7). To undermine the dichotomous system of transsexuality, for example, we should consider redefining the genitals and reproductive systems to fit a broader and more diverse range of sexual entities, "sexual responses which have a broader range than male or female orgasms" (Hughes and Dvorsky 11).

Similar to transsexualism, intersex people are often forced by social norms to adjust their sex, mainly in the early stages of their life, to adjust them to more socially acceptable sex characteristics. Intersex children are born with sex characteristics (including genitals, gonads and chromosome patterns) that do not fit typical binary notions of male or female bodies. A United Nations Office of the High Commissioner for Human Rights report indicates that medical procedures such as surgeries and hormonal treatments cause them to feel like they are being

“forced into sex and gender categories that do not fit them” (1) and as such cause “permanent infertility, pain, incontinence, loss of sexual sensation, and lifelong mental suffering, including depression” (1).

Scientific understanding of genetics, hormones, and biological procedures has gradually come to our general awareness. However, these technologies do not exist in a vacuum. Thus, according to Parkhurst, these technologies are “deeply informed by the cultural system and biosocial trajectories in which they are embedded, and indeed quite often necessarily overlap” (71). As such, transsexual procedures are often based on the “male-to-female and female-to-male” (Hughes and Dvorsky 6) transformation as “they often adopted extreme versions of gender stereotypes in order to legitimate their transition” (Hughes and Dvorsky 6).

Historical efforts to use body modifications to move beyond the dichotomous boundaries of gender and sex have fallen back to binary norms, mostly because human ontology is still dictated by a conventional dichotomy.

Postgender technologies, categorized by Hughes and Dvorsky, could blur the distinctions between binary classifications of sex, gender, and sexuality. Hughes and Dvorsky claim that “our contemporary efforts at creating gender-neutral societies have reached the limits of biological gender” (13). As such, postgenderism technologies will be designed and categorized based on their ability to change the physical, biological, and chemical parameters of the human body that define the biological sex.

Hughes and Dvorsky were able to map five groups of postgender technologies:

- Reproduction: Contraception, Abortion, Assisted Reproduction, and Artificial Wombs
- Sex Reassignment and Designer Genitals
- Virtual Bodies: Singularity and AI
- The Gendered Brain: Neurotechnologies and chemicals such as hormones that affect gender identity, gendered cognition, and sexual preference
- Industrial Machinery, and Service and Intellectual Labor

The technologies mentioned above set the stage for future predictions in that they encompass the scope of my research of trends and drivers for the change I am about to describe. They also provide the background for the timeline I chose to practice in my scenarios, considering the time estimated for their development and integration as mass technologies.

That being said, we must consider that “technological innovation is itself shaped by the social circumstances within which it takes place” (Wajcman). We must consider the social norms on which these innovations are based. “Crucially, the notion that technology is simply the product of rational technical imperatives has been dislodged. Objects and artefacts are no longer seen as separate from society, but as part of the social fabric that holds society together; they are never merely technical or social” (Wajcman).

The Xenofeminism manifesto acknowledges the critique of gender bias in technology and science, and reflects on the neo-rationality in the fields of science, technology, and mathematics.

Science is not an expression but a suspension of gender. If today it is dominated by masculine egos, then it is at odds with itself — and this contradiction can be leveraged. Reason, like information, wants to be free, and patriarchy cannot give it freedom. Rationalism must itself be a feminism. XF marks the point where these claims intersect in a two-way dependency. It names reason as an engine of feminist emancipation, and declares the right of everyone to speak as no one in particular. (0x04)

An Inclusive Future

We believe that by speculating more, at all levels of society, and exploring alternative scenarios, reality will become more malleable and, although the future cannot be predicted, we can help set in place today factors that will increase the probability of more desirable futures happening. (Dunne and Raby 6)

Foresight, as a way of experimenting with long-term speculations, is a way to describe possible future scenarios to inspire, rethink, and encourage a shift in social values.

In his paper, “Six pillars: futures thinking for transforming,” Sohail Inayatullah lists six concepts of futures thinking. In the context of my work, I am interested in the fifth concept—a model of social change—because it encourages critical thinking about the future and rests on the belief

that “. . . the future is not given, but created by our daily actions, and that we must take the ‘bull by the horns’” (6).

Envisioning future scenarios is an important process for “visioning, imagining, and critiquing the social space around us, and ultimately challenging the colonial norms fraught in our daily lives” (Simpson 34–35). By exploring a shared interest related to a wide-ranging group, speculating on the future has become a promising practice that accelerates social, cultural, and economic changes in the digital culture, affecting “what we will do, think, and build” (Brooks).

However, future narratives often carry social and cultural asymmetry, as different minority groups such as Afro-Americans, Indigenous Peoples, and women are excluded, neglected, or ignored. The future language is still affected by colonialism and patriarchy, and limited by narrow social and cultural boundaries. “Those that have suffered the most repression continue to reside at the gates and fringes of a society that glimpses their status with a shrug” (Brooks).

This section of the literature review discusses ways in which minority groups, such as Afro-Americans, Indigenous, and women, who are often excluded from future planning, represent a distinctly white, Western, middle- and higher-class socioeconomic status.

Although my scenario does not deal with issues such as race or ethnicity, I consider it necessary to review the efforts made by these groups as an opportunity to support them and learn about their ways of visualization of the future in an attempt to create a future scenario that represents more diverse groups.

Activist groups representing minorities, such as Afrofuturism and other similar movements, have created narratives that represent a future in which they are included in order to inspire minorities and the general population and to perpetuate their heritage as part of the future. Some of the narratives describe a dystopian reality, which allows critical observation of what is dangerous, under the question *What if?* to enable a better future. A futuristic—dystopian or utopian—scenario is essential to any common future because it presents not only the coveted future but also the future we seek to avoid.

By creating blueprints of the possible and providing a place where we can explore the potential pitfalls of certain paths, Indigenous futurist imaginings make it possible to transcend the confines of time and accepted “truths”—so often hegemonically configured and reinforced—that effectively limit what we can see and experience as possible in the present, let alone imagine into the future. (Medak-Saltzman)

Afrofuturism is a term coined by Mark Dery in his 1993 essay “Black to the Future.” It “has become the umbrella term for considering how science fiction, fantasy, and technology can be used to imagine and reimagine lost pasts and new futures for alienated, black others” (Anderson & Jones 11). Its purpose is to restructure future thinking to accommodate a greater presence of the African experience. Africans, as part of the colonial culture, suffered oppression and erasure of their culture and identity. Afrofuturism helps place African culture as a popular culture. It places it on the future map by creating a mosaic of cultural images, such as a manner of speech, music, and art, to ensure the recognition of the African culture as a genuine part of the future. Afrofuturism is “as much a reclamation project of a revisionist past as it is an imaginary future” (Anderson & Jones 77).

The substantial absence of racial diversity in mainstream representations of the future, such as in television shows, movie, and science fiction literature, is perhaps the best demonstration of the problem with futurism. When “Star Trek,” a sci-fi television show, first aired in the 1960s, it managed to break away from standard conventions by including a few non-white main characters—among them Lieutenant Nyota Uhura, played by Nichelle Nichols. When Nichelle Nichols announced that she was leaving the show, the Rev. Dr. Martin Luther King, Jr. asked her to reconsider, as her role “reflect[s] what we are fighting for” (Martin). In many ways, her role contributes to “an imagined future with the goals of the civil rights movement . . . diverse representations matter, that the future is anything but fixed, that we have the ability, and indeed a duty, to fight on many fronts and, in many ways, to build more inclusive, just, and ethical futures” (Medak-Saltzman).

A sense of time plays an important part of the future narrative. The New Zealand Indigenous People, for example, use time as a motivation to create future scenarios that describe their heritage and perpetuate it for future generations (Wheturangi 1). “By looking at the past it enables us to confront the needs of today in order to build platforms for tomorrow” (Durie 4). Practicing the writing of the future allows them to “continue to develop new discourses and recognise ways in which we can celebrate our diversity while still maintaining our respective cultures” (Wheturangi 10).

In her project “Indigenization of cyberspace,” Mohawk new media artist Skawennati uses virtual reality as a medium to tell the story of the Aboriginal. Her motivation comes from the need to tell

the story of who they are, in the present. She is hoping to inspire interest among participants to discover more details about their lives and heritage, saying, “It doesn’t just have to be our traditional or ancient stories. It can also be stories about who we are today. It can also be stories about who we want to be in the future. But what’s important is that it’s our stories. And we realized that we need to teach people how to use the tools in cyberspace” (CBC Radio).

In a similar way, envisioning feminist futures is necessary to find the untold stories of the future of women; to explore different interpretations of history. “Futurism is inherently problematic . . . in its adherence to technology-driven visions that play out a limited dualism of utopias and dystopias” (Kember). Future technologies reinforce gender stereotypes while nevertheless changing our world. They are driven by asymmetries in power and knowledge between genders, often controlled, and justified, by masculine power. In gendered visions of the *smart home*, nurses and housekeepers are portrayed as female ambient intelligence: “Ambient intelligent nurses, come when they were called and cost next to nothing compared with the flesh and blood variety who are already ever more precariously employed” (Kember).

Feminist futurism must take responsibility for placing women in a future that is not limited by technological means. We must examine feminist genealogies to learn from the ideas and areas of feminist debate that have been silenced for years. It is about the “process of iteration and transformation . . . a display of an imaginative faculty” (Kember) to avoid repeating old ideas. “Imagination is a powerful tool for helping to envision, bring about, and build better futures” (Medak-Saltzman).

Science fiction has been used as a medium for feminist theory to explore the future while discussing subjects such as gender inequality, sexuality, race, economics, and reproduction (Helford 291). Some of the most notable feminist science fiction works of Octavia Butler, Margaret Atwood, and Ursula K. Le Guin have explored these themes through different possibilities ranging between utopia and dystopia, to explore a society in which gender differences or gender power imbalances either do not exist, or in which gender inequalities are intensified.

In her book *The Left Hand of Darkness*, Le Guin describes the utopian story of the planet Gethen in which the natives are an intelligent, unique, non-gendered race. More precisely, every creature is sexless except when sexual intercourse with another individual takes place once a month, at which point it takes on the feminine or masculine role. This tendency is not consistent; in any sexual contact an individual may function as male or female, and does not have a choice of which role it will play. LeGuin's story line invites us to consider a reality free of sexual norms and gender roles—a situation in which most of the time, all the creatures are truly equal. LeGuin also claims that the equality we perceive between male and female is fake and that the discrimination between male and female is a construct of our minds.

From the other side, Atwood's *A Handmaid's Tale* invites us to explore a dystopian future in which women are subjugated in a patriarchal society in which fertile women's social function is to bear children for infertile wives. The story describes the various means by which these women attempt to gain individualism and independence while raising important issues in relation to gender norms.

By presenting the extreme views of the future, Le Guin and Atwood stress the importance of considering a change in social norms and create a discourse on sex and gender.

Summary

This overview of feminist, gender, posthumanism and foresight theories that support rationality and the need to envision a postgender future. Feminist theories support claims that women's liberation will be impossible as long as women are still tied to gender roles by the patriarchal society, including the role of reproduction. In my research for a means of blurring the dichotomy between biological sexes, I focused on technologies of the self. This led to an alternative: a postgender future explored through a narrative which provides a critical view of the possible futures which break the social norms associated with gender.

The theoretical research prepares the ground for the development of the practical part of my study: an interactive novel that allows a critical view of the future of gender.

Chapter 3: Methodology

Introduction

The practice component of my thesis speculates on the feasibility of living in a postgender future, a future in which social norms related to our biological sex do not limit or define the individual. Through the use of technologies of the self, I reflect on how individuals can achieve the sense of agency—a full realization of their potential, based on a free choice.

These speculations take the form of scenarios based on reviews of emergent and immersive technologies; literature reviews of feminist, gender, and cyborg theories; and how these theories and technologies will shift and affect people over the next fifty years.

With my work, I acknowledge that the future cannot be determined with certainty. In fact, “The future” cannot be “predicted” because “the future” does not exist” (Dator 2). But anticipating the future is not pointless; even though the future cannot be predicted with certainty, foresight gathers many methods and theories which “enable individuals and groups to anticipate the futures more usefully and to shape it appreciably more to their own preferences” (Dator 1). Therefore, I make use of future studies as a critical approach to strive for the desired change in social norms to help me envision the alternative future I wish to see.

Thinking about the future can be done in several ways. The range, as I will describe later in my work, in the cone of plausibility considers parameters such as time, the laws of physics, and the levels of “latents and levels of reality” (Poli 71).

I also acknowledge the importance of speculation as part of planning the future. Framing my project under the term *speculative* contributed to my ability to conceptualize and be more creative with the future I imagine. It helped with undermining what we consider as normal and feasible, to go beyond the acceptable, and to keep an open mind when it comes to imagining future technologies. As futurist Jim Dator stated, “Any useful idea about the future should appear to be ridiculous” (Dator 2).

Fiction, by definition, challenges our expectations of reality. During my experimenting process with scenario writing, I found that while working on future predictions based on other methods such as the two axes and VERGE, which are considered to be more realistic, I was constantly challenged by the grip of reality which made me question every detail in my story and challenged me to move beyond what was considered logical and acceptable.

Roberto Poli describes the ontology of foresight:

There is no reason to assume that all possibles are dispositions. Some possibles are indeed hopes, fears or intuitions, and they can either be inchoate and still incipient cognitive modes or already articulated modes ready to become explicit stances. The fundamental step forward taken by Bell clarifies that the past, present and future are reciprocally linked together, that there are structures connecting them, and that these

structures are present even when they have not been explicitly activated. Not everything real is fully displaced in front of us. There are reals that are there even if they are in a dormant mode. (70)

When beginning to write my thesis, it was important for me to scope my writing and creative work with suitable methodologies. After defining my research questions, I moved on to define my objectives and rationale. I used some of the more common objectives, mentioned by Popper, as objectives that are often used as part of investigating the future (45):

- Fostering science, technology and innovation;
- Recognizing key barriers and drivers; and
- Encouraging strategic and future thinking.

Based on these objectives and research questions, I realized that by combining methodologies of speculative design and foresight with feminist frameworks for game design, I would be able to achieve my goals:

- Define the question I want to address in my speculations about the future.
- Offer possible future scenarios that present possibilities of the future that I imagine.
- Turn the scenarios into an interactive narrative which will help game players explore and envision the new future.

In this context, it is essential to acknowledge that speculative design as a methodology deals with critical future thinking, but does not operate on a timeline. It is speculating on a possible future design without addressing the development of events in a particular time frame. Foresight methodologies such as scenario development are triggered and scoped by a timeline;

Moving Toward Agency. How Technology of the Self can Liberate Humans from the Social Constraints of Biological Sex.

integrating both of these methodologies provides the right tools to answer my research questions.

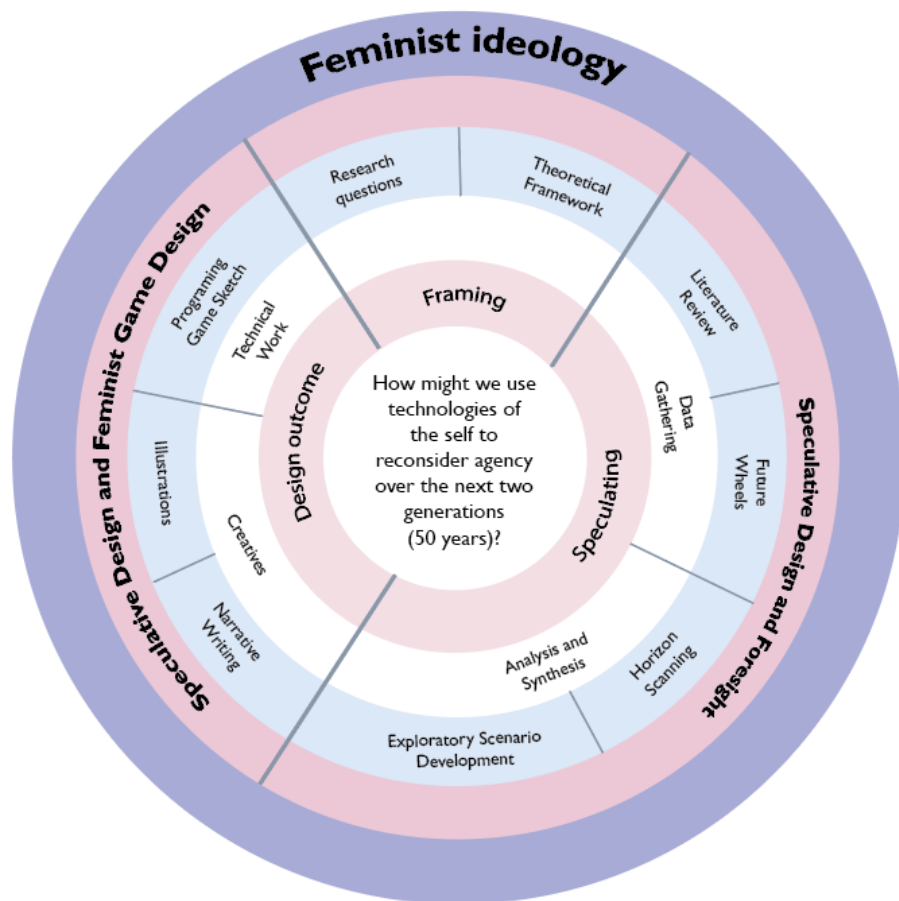


Figure 1: methodologies breakdown

Speculative Design

Definition

Speculative design is a practice, based on critical thinking and promoting dialogue, which casts doubt on the practice of design (and in its essentialism). It addresses the question of *What if?* to examine possible solutions to a current problem and improve the status quo. The methodology examines the interrelationships between potential changes in technological development and social relations. It deals with the design of our everyday lives via digital artifacts (Dunne and Raby 1-6).

Speculative design methodology takes a critical approach and deals with the imagination and vision of possible scenarios that help determine the starting point of the future. The scenarios, however, do not exist only in a futuristic vacuum. These future scenarios represent events that can happen, based on our current knowledge of how things work. They stem from a contemporary understanding of physical laws, processes, causality, systems of human interaction, and more. They are influenced by the present, which fundamentally affects our planned vision for the future. In contrast to the open form of science fiction, speculative literature has a connection between the present and the imaginary future (Dunne and Raby 1-6).

The methodology deals not only with the future we want but also helps us plan how to avoid a future we fear will come true if we do not make critical decisions about the role of new technologies in society. The goal of the design process is always to improve the future, so the future is a dominant factor in many design activities.

Speculative design is one of many co-evolving terms such as design fiction, critical design, science fiction prototype, experimental futures, and social fiction. I chose to work with speculative design as it is based on the worlds of science fiction writing with design, which suits the goal of the practice part of my thesis.

What if?

Future narratives are often formed into scenarios, describing not only the future people want to live in but also what needs to be done in the present in order to get there. *What-if* scenarios help “strip narrative and plot right down to basics in order to explore an idea . . . They unpick where, why, and how things could break down or go wrong” (Dunne and Raby 86).

What-if scenarios were originally used in English science fiction literature and cinema in the 1950s, mostly exploring the extreme circumstances and drama of a post-apocalyptic society (Dunne and Raby 86).

Using speculative design aids my strategic goal of exploring the effect of body-related technology on expanding gender norms. Envisioning the future of gender, through scenarios ranging from preferable to possible futures, I aimed to address the *What-if* question that is relevant to my research: “What if our lives could be conducted as if they were free of gender limitations?”

Formatting the *What-if* question at the beginning of the scenario development helped create a clear structure to provide context and focus for the scenarios. It also lent greater importance to inhibiting trends during scenario planning.

Foresight Methodologies

Foresight

In the book *The handbook of technology foresight: concepts and practice*, Dr. Rafael Popper defines foresight as “a process which involves intense iterative periods of open reflection, networking, consultation and discussion, leading to the joint refining of future visions and common space for open thinking on the future and the incubation of strategic approaches. (45)

My work process with foresight breaks down into three phases: data gathering, analysis and synthesis, and design outcome. Each step is supported by different methods and frameworks, all grounded by a feminist framework and the *What-if* question.

Data Gathering

Data gathering is an important part of the foresight process. It is where knowledge (existing and new) is gathered and mapped to create scenarios. For data gathering, I used literature review, future wheels, and horizon scanning. The process was not linear; it included moving back and

forth between the literature review and horizon scanning until the full mapping was completed.

Literature Review

In the first step of horizon scanning, exploration, I used literature review as a method to collect relevant data, and future wheels to help identify the main ideas and organize the data.

Literature review is a fundamental part of the horizon scanning process. It is the analysis of data gathered from diverse sources such as reports, books, art, websites, and academic research to identify the trends and drivers that might affect the future. The more diverse the sources are, the better the chances to identify and map these contributions (Popper 58).

In my literature review, I used the Foresight Diamond to map the potential resources for the gathering stage. Popper defines the Foresight Diamond as “a practical framework for mapping the 33 methods . . . in terms of the core type of knowledge source each method is mainly based upon” (70). I was focusing on the Creativity, Expertise, and Evidence regions of the diamond, and on the range of qualitative to semi-quantitative sources.

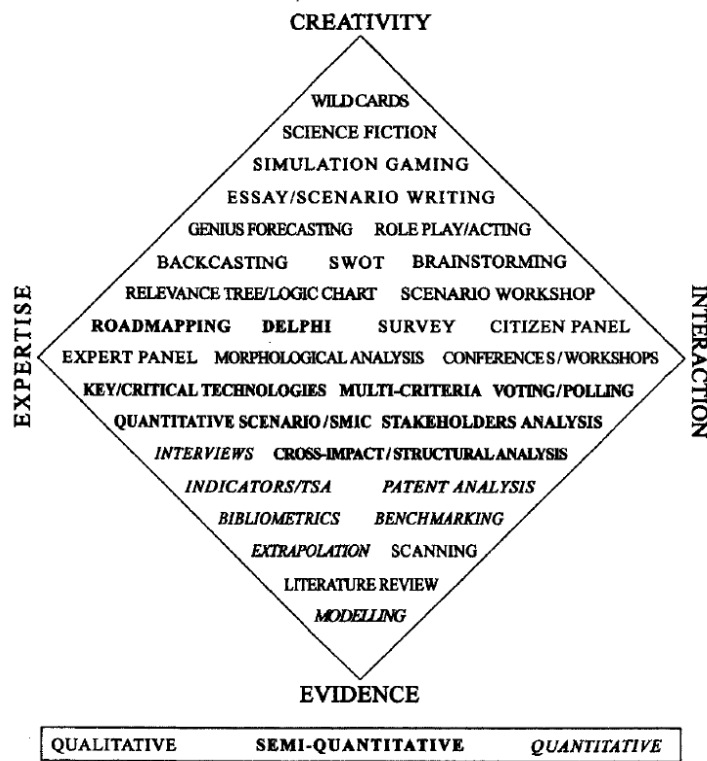


Figure 2: Foresight Diamond (Popper 71)

Future Wheels

After I gathered the data, I used future wheels as a data visualization tool. A future wheel is a method often used in strategic foresight to visually identify the direct and indirect consequences of a particular change or development. The Future Wheel was created by Jerome Glenn in 1972.

Future wheels are built on three levels. The first level, the central term of the future wheel, describes the change to evaluate. The second level displays a list of events or consequences

following directly from that initial change. The third level shows the indirect consequences of the direct consequences. The terms may be connected as nodes in a tree. (Glenn)

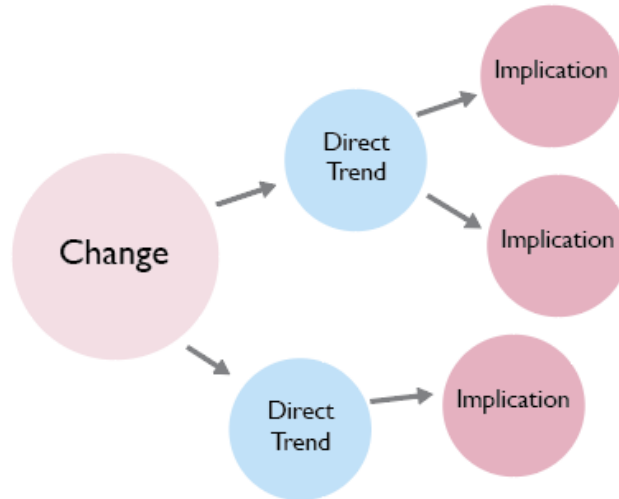


Figure 3: Future Wheel model (Glenn)

As part of my literature review, I used future wheels to help with mapping the main ideas of the text. I worked with the same model, moving from the center out, to identify the direct and indirect (secondary and tertiary) consequences of each idea. The visual representation of the key ideas contributed to the rapid identification of trends and drivers; this helped me define them more clearly while showing their potential secondary effect. Below is an example of a future wheel. The rest are included as part of the appendix.

Moving Toward Agency. How Technology of the Self can Liberate Humans from the Social Constraints of Biological Sex.



Figure 4: Future Wheel of Amy Webb's 2018 "Tech Trends Report". Describing the direct and secondary and tertiary indirect consequences.

Analysis and Synthesis

Horizon Scanning

The Organisation for Economic Co-operation and Development (OECD) defines horizon scanning as

a technique for detecting early signs of potentially important developments through a systematic examination of potential threats and opportunities, with emphasis on new technology and its effects on the issue at hand. The method calls for determining what is constant, what changes, and what constantly changes.

Horizon scanning is mostly about desk research, using a wide variety of sources to develop the big picture behind the issues to be examined. Its purpose is to “scan” how new events might influence the future by assessing trends and drivers to feed into a scenario development process. (OECD)

Its main purpose is “getting a grip on the key trends ‘out there’” (Slaughter 442). Using Conway’s “scanning triangle,” I started by mapping the data I collected through the literature review and future wheels to a list of trends and drivers. A trend, in foresight, is “a change that affects a wide range of people and that has, or will eventually have broad social, economic, or political implications” (Gordon 136).

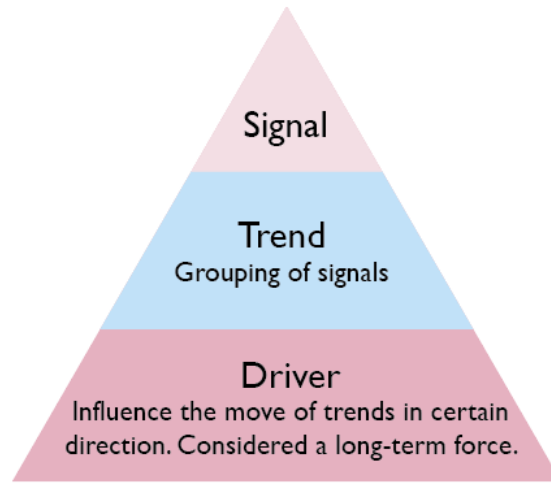


Figure 5: The Scanning Triangle (Conway)

For the horizon scanning, I chose to use STEEP+VL framework to help map the trends based on different macro-environments. STEEP+VL is a common framework in foresight, and it is known in its different variations of acronym based on the macro-environments it includes. I chose to include: Social, Technology, Environmental, Economic, Political, Values, and Legal. The horizon scanning is included as part of the appendix A as the full list of trends and drivers.

Exploratory Scenario Development

Exploratory scenario development is the last part of the process and it is the result of “both planning and development, where scenario planning is the output of a comprehensive foresight study and scenario development is about crafting stories of the future” (Bishop et al. 9).

Alun Rhydderch defines scenarios as “stories (or narratives) set in the future, which describe how the world might look in, say, 2015 or 2050. They explore how the world would change if certain trends were to strengthen or diminish, or various events were to occur.” (5)

Scenario planning represents some of the infinite number of possible futures, but it does not attempt to determine which future is more likely to take place. Instead, it provides a reference when assessing the possibilities (Rhydderch 5).

There are no strict rules about the proper duration for scenario planning. Traditionally they tend to look 10-15 years ahead. However, based on the question that is being examined, it may vary from a shorter period to a much longer one (Rhydderch 9).

The Cone of Plausibility

Joseph Voros outlines the four approaches to describe the future: possible future, plausible future, probable future, and preferred future. Voros distinguished scenarios, based on their hold in reality and the application of physical/human interaction laws, then extended them to an often emotional rather than cognitive aspect in the realm of inspiration and complete imagination (16).

Voros defines (16) the four cones based on their characteristics and common use:

- Probable future: What is likely to happen unless an extreme upheaval event occurs, such as war or natural disaster. This cone is where most designers operate.

- Plausible future: What could happen. This future is often used for scenario planning and foresight, mostly for exploring alternative futures.
- Possible future: A speculative future which shows how we would get from here, today's world, to there, the suggested one. The possible future is subject to two laws: it should be scientifically possible, and it should describe the path—a set of reliable events that lead to the new future, even if they are entirely fictional.
- Preferable future: The idea of a preferable future which raises questions such as preferable for whom and by whom. It is usually used by governments and industries.

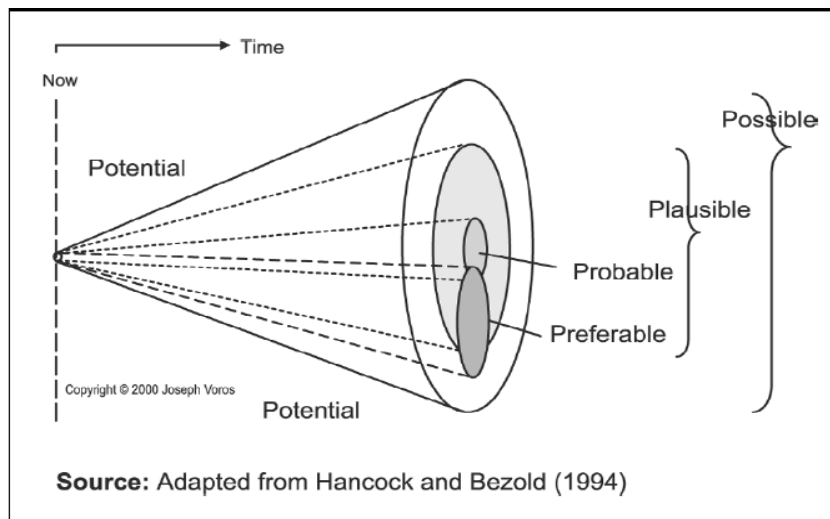


Figure 6: The futures cone, based on Nesta model (Voros)

Methods

As part of my experiment with scenario writing, I chose to practice with three different frameworks: the two axes, VERGE, and science fictioning. Each method helped with describing the future from a slightly different angle.

I chose to frame my research question with a 50-year horizon. My initial experience in scenario writing was defined as a 30-year term, but after completing my literature review and mapping the trends and drivers, I realized that the 30-year timeframe I set was inadequate for several reasons. First, forecasts for development and accessibility of the technology I chose to focus on demanded a longer time frame. Second, I felt that the 30-year time frame was not flexible enough to allow me to be speculative, imaginative, and creative. The 50-year time frame allowed me to move beyond a reasonable limit and extend my imagination while still maintaining a level of hypothetical feasibility.

Although my initial planning was to create speculative scenarios, I found it necessary to experiment with different frameworks in order to test the similarities and differences between the scenarios. In addition to the science fictioning scenario, which I chose as the base of the game narrative, I chose to test the two axes and VERGE (both included as part of the appendix). I found that working with different frameworks contributed to the writing of the final scenario by pointing to weaknesses and adding more layers to the science fictioning method.

The scenario writing process included several iterations which were influenced by the writing of the other scenarios, comparison points that I needed to address, and the writing of the

interactive narrative that pushed the boundaries of the scenario to provide additional information to the game player.

The final method I chose for the game narrative is science fictioning. Popper defines science fictioning as “an activity that deals with stories assuming that possible events which have not yet materialised have taken place, usually at some point in the future, and elaborates on the consequences of this” (60).

Brian David Johnson popularized the use of science fictioning in his book *Science Fiction Prototyping*, to describe an imagined future world. While science fictioning narratives often lack drive to promote the story, they do have considerable illustrative force. The main limitation of this method is the need for imaginative and abstract mindsets, since it is motivated by imaginary events (12).

The need for experimenting with the science fictioning method for scenario writing became apparent after I completed writing scenarios based on the two axes and VERGE methods. I wanted to experiment with a method that would allow me to test a less realistic and more imaginative scenario. Since science fictioning is not restricted by current events; it can push the sense of reality a bit farther beyond reason and logic. Using science fictioning helped me create an alternate future that is more likely not to happen, but I found it intriguing, exciting, and inspiring.

My choice of methods for scenario writing allowed me to create a wide variety of scenarios that differ in their essence, their point of focus, and their feasibility. Experimenting with different methods helped expand the future world I created and added more layers to the story, which I used as the narrative for the interactive novel.

Understanding the core and principles of each method is essential when choosing the right methods for the work. I found that the methodologies I chose worked well with the timespan I defined, giving me enough room to develop scenarios based on real events. At the same time, I was able to stretch the story a bit based on my possible consequences that do not necessarily have a hold in reality, creating a half “real,” half fiction future world.

After testing different methods for the scenario writing, I determined that science fictioning was the most suitable way to experiment within the context of my work. Science fictioning provided the right framework for my scenario writing and helped me overcome some of the limitations I had when working with other methods, such as reliability when relating to time, or feasibility for the existence of certain technologies. I found that working with science fictioning also helped me, as a writer, to think beyond structures of the reality of the present. I was able to ignore time, rules, geography, norms, politics, and even logic, and disconnect myself from the familiar and reasonable. By doing so I was able to better envision a future which describes such a drastic change. Recalling Jim Dator’s assertion that “Any useful idea about the future should appear to be ridiculous,” I managed to envision a future which on one hand is grounded to some extent in the familiar of the present, but on the other hand, might seem a bit ridiculous.

Foresight and Game Design

Game researcher Mary Flanagan is often cited in the field of foresight, as she brought about a change in the concept of games when she questioned the essential use of games as entertainment media: “What if some games, and the more general concept of ‘play’ not only provide outlets for entertainment but also function as means for creative expression, as instruments for conceptual thinking, or as tools to help examine or work through social issues?” (Flanagan 1). Jane McGonigal, a designer and futurist, contributed to the evolution of combining games and futures by asking, “What if we decided to use everything we know about game design to fix what’s wrong with reality?” (McGonigal 7). And thus in parallel processes “just as games are venturing into serious territory, the at times overwhelmingly serious practice of futures has been learning to be more playful” (Candy 234).

As discussed previously in the literature review, foresight may be used as a way to critique problematic issues and perpetuate a preferable future envisioned by the scenario writer. Similarly, social foresight, a term initially conceived by Richard A. Slaughter, is a way of influencing future generations. “Rethinking epistemic and cultural assumptions could lead to more fruitful answers to pressing problems, and open up new spaces for creativity and action” (Ramos 27).

The intersection of both fields, games and social foresight, creates a frame for demonstrating ideas that might inspire a real change in social values. The games field enables critical future thinking as “a method for popularising and demystifying futures” (Candy 234) and sets its

objective to “undefine the future” (Inayatullah 10) by striving to redefine cultural and social assumptions and paradigms.

Feminist Framework for Game Design

Feminist game design practice is an emerging set of practices; here I have used the research of Westecott (2015) that suggests one approach to building feminist-identified games. My work involves speculating on a change in social values related to gender and I have focused on the text and illustration as mediums to communicate these values. My use of Westecott’s feminist framework for game design arises from the need to find a way to integrate values such as equity, awareness, and respect in the game.

Over the years, games evolved from being a source of entertainment to becoming a mechanism to convey politics and values to game players (Flanagan 1). Any means of representation cannot remain separate from the world around it: “. . . all representational form is political, that there is no objectivity as every artefact made by human hand expresses the values of its maker” (Westecott 3). Thus, games can be seen as vehicles for the presentation of feminist ideologies.

Personal Games

In her thesis, Emma Westecott reviews the history of personal games as a category of games interested in expressing personal, and politicized, approaches to game development (198). By reviewing the work of game developers such as Anna Anthropy and Merritt Kopas, she points to

the richness of personal and expressive approaches to game design. Westecott indicates that personal game creators take players on a journey that enables them to play from the point of view of the maker (199). Game makers give players a chance to play new realities, which “offers the individual engaging in these actions an explicit and immediate sense of agency in their activity” (201).

As part of the growing community of trans and queer makers using games to express their voices and politics, personal games have become an accepted medium to “model a problematic social dynamic” (200). Activists have found in games a legitimate platform to assimilate politics that push back against oppression, regardless of gender, sexual preference, race, class, or ability. “The growth and cohesion of these voices into a movement follows models adopted by the early women’s movement” (Westecott 201).

Feminist Games

Given the wider context of the rise of political practice in game making, it is possible to see a growth of interest in feminist activism in game studies and game design, while there is speculation as to what a feminist game might be (Westecott 180).

By acknowledging that digital games perpetuate gender stereotypes in the way they represent the female figure, a subject I expand on later, it was important for me, as a woman, to make sure that the game I am creating will not propagate the same stereotypes.

A Suggested Feminist Game Design Framework

In her thesis, “Performing Play in Digital Games: Mapping Feminist Futures,” feminist game researcher Emma Westecott uses, among others, Mary Flanagan’s “tripartite schema of reskinning, unplaying and re-writing” (210) to suggest a feminist framework of game design. The suggested framework looks at ways in which game making can be used as a critical space for feminist agendas and “as a possibility space ripe for modding and for imaginative re-interpretation.” (210)

As part of her framework, Westecott identified techniques that “challenge[d] representational practices” (210). I summarize some of the points mentioned by Westecott’s suggested framework that was relevant to my work. In the process of creating the game, I used these points as guidelines to support critical thinking related to the making of a feminist game moving away from gender stereotypes.

- Player identity: “. . . when I control an onscreen player-character our co-joined nature — achieved via the apparatus of gameplay — offers opportunity for a type of gender play . . . experiment with gender representation and gender expression . . .”
- Animation: “. . . the abstraction inherent to all forms of animation opens up opportunities for different narratives.” In addition, the use of animation to create “anthropomorphised characters” might contribute to blurring the representation of gender, by “heightened fluidity in the showing, and swapping, of markers of gender.” Westecott also refers to the use of colours—avoiding gendered colours such as pink to associate with feminine motives and blue with masculine.

- The goal of the game: “I suggest the focus should rather be on the ability for all players to play as powerful, able, and equal women and men.”
- Distributed Subjectivity: “site for identity play in which the explicit expectation is to engage with a fictional character rather than in representation of self, however fictional . . . to “disturb the ongoing relationship between a player and her player character in interesting and potentially productive ways.” Maintaining a distance between a player and her gameplay experience through the intentional use of stylistic and structural devices holds potential for feminist engagement in digital game form.
- External representations: referring to body shape and clothes as they often lean on gender stereotypes. Moving away from stereotypes involved in body shape “. . . to fit social norms for beauty in terms of weight, age and body shape” and paying attention to external representations such as appearance: “through costume an individual takes on the role, and identity, of that costume however fictional or transitory.”

Moreover, as my game is based on a narrative, I used Elizabeth Grosz’s essay “Feminism after the Death of the Author” to identify the key elements for framing a feminist text. According to Grosz, a feminist text should challenge traditional norms. It must move away from “standard masculinist ways” (23). Moreover, it should help establish “. . . discursive spaces, new styles, modes of analysis and argument, new genres and forms — that contest the limits and constraints currently at work in the regulation of textual production and reception” (23).

Summary

In an effort to answer my research question, I used a combination of methodologies: speculative design, foresight methodologies, and a feminist framework for game design. These methodologies helped me tackle each component of my work with the right tools that led to a vision of a speculative postgender world resulting from the use of technology.

My practice with the methodologies was very adaptable. I combined different methods, frameworks, and techniques based on the needs of the project, as I believe that every creative process is individual and as such has different needs.

As part of the appendix, I include all the work that was done while experimenting with the different methods but was not part of my final findings.

Chapter 4: Explorations

Introduction

Prior to writing the thesis, I participated in two courses that enabled me to explore and experiment with frameworks and methods of foresight. The first project I created, in the course Possible Futures with Professor Cindy Poremba at OCAD University, was a graphic novel that combines sections from a future scenario I wrote under the title *How Technologies Might Reduce Gaps Between Genders*. The graphic novel won a student recognition award from the Association of Professional Futurists (APF).

After this project was completed, I was very intrigued by the world of foresight and forecasting, and I wanted to expand my knowledge in that area. During the summer semester, I took an independent studies course with Professor Suzanne Stein to develop my professional toolkit. The result was a project entitled *How Immersive Technologies Might Affect the Future of Gender*. The process included a literature review of various resources, a conceptual mapping of the main ideas examined in the literature review using future wheels, horizon scanning (a list of trends and drivers mapped based on the STEEP+VL), and six future scenarios based on various methods such as the two axes (a total of four scenarios), VERGE, and science fictioning.

In the final thesis project, I chose to develop the scenario based on the science fictioning method, and to explore how to make the scenario more accessible to a broader audience, as I will expand upon in Chapter Four: Final Work and Reflections.

Trends and Drivers

These are the trends and drivers created based on the literature I reviewed. I used future wheels to identify the main ideas from each source and map them to the trends and drivers analysis. The list of trends is divided into seven macro-environments based on the STEEP+VL model. The following list includes the trends I used for the final scenario, based on the science fictioning method. For this part of my work, I drew and expanded on the decks of cards created by Stein et al., from the Super Ordinary Lab at OCAD University. The full list of trends and drivers are in the appendix.

List of Trends and Drivers

Drivers

- **Transhumanism (H+)**

Aims to transform the human condition by developing and making widely available sophisticated technologies to greatly enhance human intellect and physiology.

Transhumanism supports diversity in the form of embodiment, which is critical to the deconstruction of both the physical and social human body.¹

¹ Malatino, Hilary. "Biohacking Gender." *Angelaki*, vol. 22, no. 2, 2017, pp. 179-190.

- **Postgenderism**

A social philosophy which seeks to reduce gender differences in humans through the use of advanced biotechnologies. Postgenderism uses technology to overcome physical differences between females and males, blurring the boundaries between the physical bodies. Transhumanism also challenges social values such as binary and heteronormative that undermine the concept of gender.²

- **Cyborg**

Hybridism of technology with the human body. Including a wide range of body-related technologies such as neurotechnology, biotechnology and reproductive technologies to enhance the human condition.³

Trends

- **Gender activism**

People who recognize gender gaps as a social issue and act to reduce it through promoting awareness and regulations.⁴

- **Tech accessibility**

The availability of technology to people from different economic classes and less developed countries. Greater availability will enable faster progress toward reducing gender and social gaps.⁵

² Ice, Valkyrie. "Best of H+: Total Gender Change within a Decade." *Hplusmagazine.com*, Humanity, 8 May 2014, hplusmagazine.com/2014/05/08/total-gender-change-within-decade/.

³ Malatino, pp. 179-190.

⁴ *Gender Equality in Codes of Conduct Guidance*. BSR, *Gender Equality in Codes of Conduct Guidance*, www.bsr.org/reports/BSR_Gender_Equality_in_Codes_of_Conduct_Guidance.pdf.

⁵ Ibid.

- **Technology accessibility as a human right**

Promoting the agenda of technology and internet accessibility as a fundamental human right, which will also help to reduce social and gender gaps.⁶

- **Biohacking agenda**

Discussions about the ethics and politics of people making changes to their bodies, and their rights to autonomy and privacy.⁷

- **Multiple realities**

In a world of multiple realities, the definition of sex is subject to change, and so is the importance of using it as identification. Using virtual reality as a simulation can help create empathy toward others and experiment with the concept of physical change.⁸

- **Sex fluidity**

Body modifications related to biological sex through the use of technology will grant us new and unusual capabilities.⁹

- **Identity in Flux**

Identity might be very fluid and changeable, and it can have different layers: age, race, gender, ethnicity, religion, geography, education, political inclinations and so on.¹⁰ The

⁶ *Women & Mobile: A Global Opportunity*. GSMA Development Fund, *Women & Mobile: A Global Opportunity* - A study on the mobile phone gender gap in low and middle-income countries, www.gsma.com/mobilefordevelopment/wp-content/uploads/2013/01/GSMA_Women_and_Mobile-A_Global_Opportunity.pdf.

⁷ Malatino, pp. 179-190.

⁸ Webb, Amy, et al. *2018 Tech Trends Report*. Future Today Institute, *2018 Tech Trends Report*, futuretodayinstitute.com/2018-tech-trends-annual-report/.

⁹ Ice.

¹⁰ Duda, Igor, and Robert Kurelić. "Introduction—Identity in Flux." *Tabula: časopis Filozofskog fakulteta, Sveučilište Jurja Dobrile u Puli* 14 (2016): 1-3.

question of self-definition: how do we define ourselves through the connections between technology, our body (physical and social), and social norms?¹¹

- **Human-centered design (behavioural science)**

Understanding people and their needs when designing technology for the human body.¹²

Scenario Writing

The last step in the process, after completing the literature review and identifying the list of trends and drivers, is the scenario writing. Looking at the timeline of fifty years, exploring the feasibility of a postgender future, I chose to experiment with three different methods: the two axes, VERGE, and design fiction. Each of these methods enabled envisioning the future from a slightly different angle, based on the uniqueness of the method. In the scope of my thesis work, I chose to develop the scenario based on the science fictioning method. The other five scenarios are included as part of the appendix.

The Science Fictioning Method Scenario

As discussed in the methodology chapter, science fictioning often relies on a question: *What if?*, creating a provocative framework for speculation from the start. This questioning format

¹¹ Malatino, pp. 179-190.

¹² Ferrando, Francesca. "Is the Post-Human a Post-Woman? Cyborgs, Robots, Artificial Intelligence and the Futures of Gender: A Case Study: Doc 43." *European Journal of Futures Research*, vol. 2, no. 1, 2014.

provides the foundation for the construction of a new fictional universe, in an alternative present or near future, which includes a new set of morals and values: “The New Normal.”

The first step in working with the science fictioning was to think about new rules that might apply in the future world. Questions such as what is the current state of humanity; what rules (social, cultural, etc.) do they live by; and what technologies are available to them. After defining these, I created the outline of the story and checked to see whether some of the trends I listed might still be relevant, and could be integrated into the scenario. In my scenario writing I addressed technology bias and access to technology as the two inhibitors. My solution was to have the technology created by a third party—non-human, genderless entities; and to support the rise of the transhumanist agenda, which claims access to technology as a human right.

From there, I expanded the scenario into a full story.

After completing the game narrative, I was looking for a way to make the connection between the world described in the scenario, the starting point, to the game narrative, which happens 50 years later. I used backcasting, a scenario writing approach, introduced by John Bridger Robinson as an approach that involves working backwards from the end-point of the scenario to the present to help with defining the events and actions required to reach the end-point (337).

Moving Toward Agency. How Technology of the Self can Liberate Humans from the Social Constraints of Biological Sex.

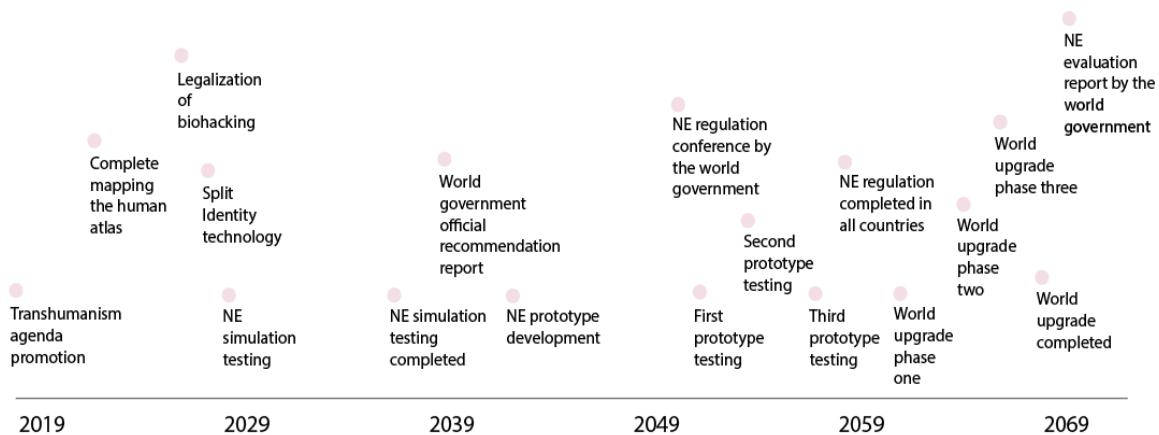


Figure 7: Backcasting of the science fictioning scenario

Scenario

It is 2038 on the Earth calendar. I have recently moved back, after spending my last 213 years between Mars and Earth as the primary supervisor to help save humanity from self-extinction. It was rainy outside when I got into my private shell in the residential area, but I requested a change. I was never a big fan of the rain, never understood its purpose. As I was lying down in my shell, I set it on sync and repair mode and turned off my vision mode. A message confirmed all repairs were completed and that my life capacity was back to infinity. I was finally able to start updating my protocol, ordering *sync to log*.

Humanity has changed a lot since my last visit here in 2028. They have always been good with rapid changes and technologies, but never with each other. That was the last goal set by the world government for the Recovery of Humanity, to help them overcome prejudice—particularly in relation to their biological sex. For years now, gender has been limiting their full potential as

individuals, restricting opportunities in almost every aspect of life, from employment and education to sports and hobbies.

The goal was to make them experience life through a simulation technology as neutrois entities (NE), so that they will be able to recognize the potential and urgency for such a change. After I introduced them to SI, the Split Identity technology, designed especially for humanity, they were able to print a duplication of their body which lives under the same identity with one major change: the absence of genitalia. The SI gathers experiences from all of its entities and processes them into one impression. The idea was to let them experience the world through the eyes of NE in order for them to increase empathy toward their future form of life.

The first step required legalization of biohacking, allowing individuals to make changes to their bodies. Humanity gives great importance to the physical body. As a life form that is subject to injuries and limited life expectancy, the maintenance of the body is considered a supreme value. One of my main concerns was to assure that the technology was available to humanity as a whole, to avoid deepening the social gaps that we have been trying so hard to reduce.

After living for almost a decade as NEs, they have finally managed to truly experience what it means to live under the notion of self and own their body. By experiencing their full potential, they have managed to recognize the need to overcome prejudices, stereotypes, disagreements, and gaps in perception related to their social values and their acceptance of other gender identities.

The next step of my mission was to assure a world upgrade to NE is completed within the next decade.

Early Stages of Prototyping: graphic novel and a game sketch

Earlier stages of my practice research took place during courses I participated in as part of my master degree studies. The process included two projects, in both paper and digital formats, which led me to the decision to create an interactive novel as a final product. Described here is a summary of the process. The full documentation is included as part of the appendix B.

The first version of the prototype was created as a final project for my Possible Future class. The assignment was framed under the title “From the Future: design fiction outcome” and was pretty much open to any personal interpretation. It is based on a DAS STEEPLE framework of demographics, aesthetics, science, socio-cultural, technological, economics, environment, political, legal, and ethics factors, and was inspired by the work of James Wallman. However, it was missing the academic rigor aspect. The project was not based on a methodological process of foresight and as such it is missing the acknowledgment of time (duration of the scenarios), definitions (what technologies I am using and why), credibility (it was created based on brief research, using non-academic sources), and scoping (what frameworks or methods I am using for the scenarios). Nonetheless, the outcome presented something very intriguing that prompted me to explore this topic more thoroughly.

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The outcome was a ten-page web-based graphic novel, reflecting on how technology might help reduce gaps between gender. The novel pairs short texts, selected parts of the scenarios, with original artwork to help to envision the main ideas of the content. The goal was to explore the effect of future scenarios on readers, and learn about the tension created between illustrations and text as part of the format.

The feedback I got was very encouraging; however, during the process, I felt many times that my lack of knowledge and tools were holding me back. I found that the illustrations were very meaningful to my work and that people found it easier to engage with my work through the illustrations. I also realized that the “consider” text I added at the end was successfully helping to start conversation between readers—which is a good takeaway for next iterations.

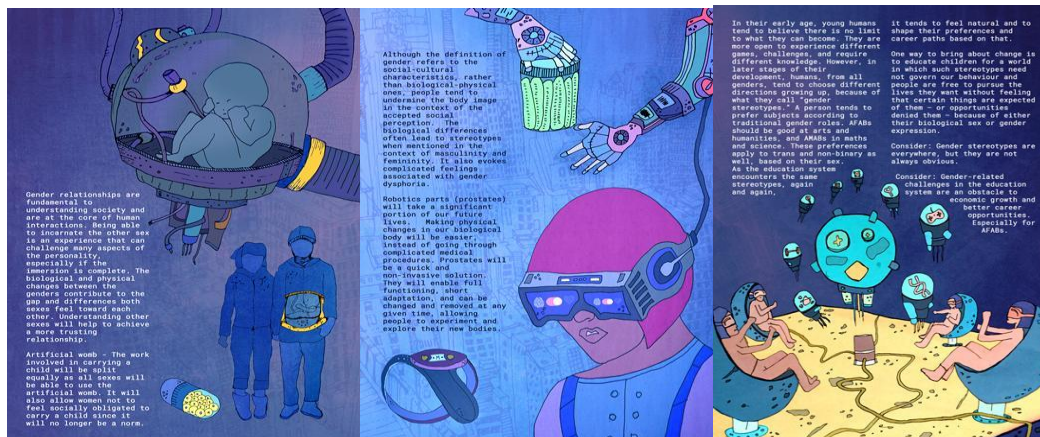


Figure 8: Graphic novel

Version two of the prototype is a mature and conscious version of the product. The second prototype was created as part of the Media Lab Prototyping course. I focused on creating a

digital version of the graphic novel to enhance engagement of the readers with the future scenario.

I created a simple game sketch using Twine—a program for creating interactive, non-linear stories—to make a sample of a speculative future scenario I created and turn it into an interactive narrative.

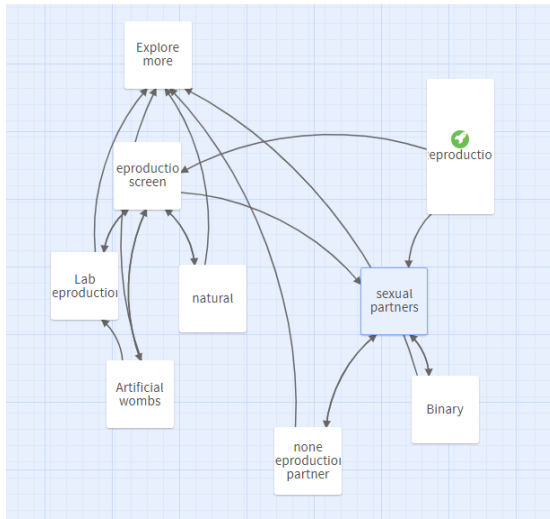
The narrative focused on dismissing the need for reproduction, and it invited the game players to reflect on related subjects, such as parameters for choosing a partner, considering whether reproduction is needed at all, and how it might affect other parts of their lives. Some screens included illustrations taken from the graphic novel.

Peer review was conducted as part of the final presentation of the prototype during the workshop, which led me to the understanding that my future work will focus on developing my prototype on these three levels:

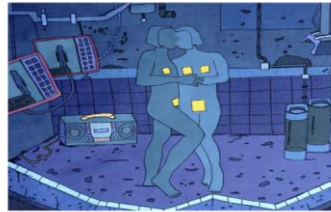
- Narrative: Research how to write and develop nonlinear narratives.
- Peer review: Recruit a more diverse group of game players.
- Twine (platform): Improve my skills with this tool to get better results.

For my next iteration, I created one piece of the narrative in Twine, and develop the story and illustrations in a way that is closer to what I imagine the final product will look like.

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Sexual partners



The search for a sexual partner will be motivated by pleasure rather than improvement of the genes. You are invite to experience a sexual relationship based on sexual stimulation and satisfaction of your needs, with a non-productive sexual partners.

I want to explore a non-productive sexual partner
I want to stay binary

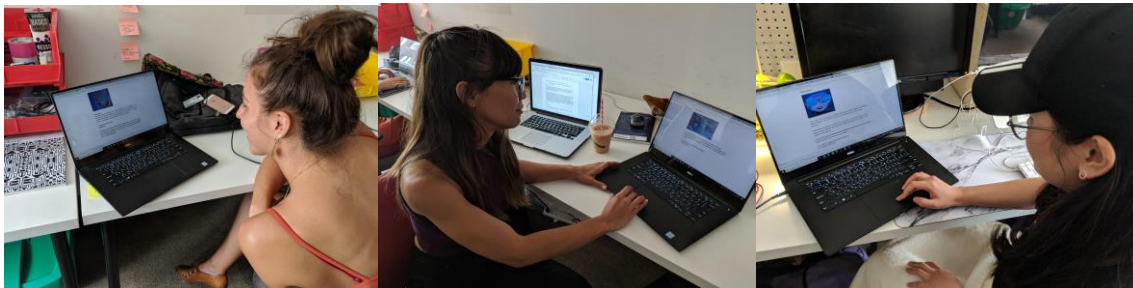


Figure 9: Documentation of the process

Chapter 5: Final Work and Reflections

Introduction

Moving from theory to practice, my practice research focused on creating a digital game *Neutrois*—a nonlinear interactive novel speculating on life in a postgender world—using critical future thinking. This approach was inspired by research on games as “a method for popularising and demystifying futures” (Candy 234). Games can serve as a medium for demonstrating ideas that might contribute to inspiring a real change in social values. The goal was to raise game players’ awareness of the limitations that gender norms have on our potential for agency.

Under the broad umbrella of speculative design methodology, my research and practice intersect through a combination of a few theories and frameworks:

- I combined scenario development (foresight methodology) with a feminist game design framework, and postgenderism and feminist technology theories to develop the game narrative. My focus was on challenging traditional norms set by patriarchy, and on the use of pronouns.
- I used cyberfeminist and postgenderism theories to describe the way technologies might be used to overcome gender and create a new social order based on values of equality and self-expression. These theories come together through the narrative and the concept artwork I chose to include in my work.
- I used feminist ideology for women’s liberation as a means to assure an equal and inclusive future as described in the future scenario I chose to include in the narrative.

The narrative is an extended version of one of six narratives I created, practicing with different future scenario methods. I choose to base the narrative on the science fictioning method scenario as I find it to be the most inspiring and creative.

I used agile approaches, a software development framework, for planning my work. The agile framework is known for its short iterations of planning and creating. Because I have little experience with game design, scoping was an essential part of my process. Agile framework helped me organize my work by framing and focusing on the essentials and optimizing my progress as a result (Collier 3-4)

My prototyping process included four iterations. I worked in layers; aiming, with each iteration, to work on the very basics and polish it along the way based on the time left for each iteration.

I used Twine as a tool to create my game. Historically, Twine has been used to create personal games. The platform is known as a tool for self-expression, allowing game designers to tell their stories. Twine provides its users with different frameworks based on their development skills. As a beginner in coding, I started working on the basic framework. I upgraded it in the fourth iteration, while working on polishing the game and gaining experience with more advanced coding functionalities.

The game includes 47 illustrations, all original artwork, which are using to enrich the game narrative and provide more information to help the game players envision the imaginary world I

created. The illustrations are framed with a few feminist game design frameworks which are expressed through the aesthetic characteristics, metaphors, and concepts I chose to present.

Third Iteration: development of the full narrative

Description

Work on this prototype focused on creating a full version of the interactive novel using Twine. At this point, aesthetics were not a priority. I was mainly focusing on the game player flow and the script for the narrative.

This iteration was the most challenging one. Most of the issues I faced involved the narrative writing, testing different point of views for the game player (first, second, and third), different flow structures, and the tone of the script.

The final script was based on a second person point of view, describing a dialogue between the game player, a Neutrois Entity (NE) and the Protocol (the game player's inner voice) as the narrator. It was based on a branch and bottleneck architecture.

Designing a Personal Feminist Game

I used two main approaches to establish my Twine game design: Flanagan's Grow-A-Game deck, a flexible tool that can be used either to analyze prior play experiences or brainstorm new game ideas (Belman, Mary, & Helen 7); and Westecott's conceptualization of gender

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representation existing along a continuum. I based my game on a set of actions such as read, choose, and reflect, to contribute to the sense of agency; and a set of values such as awareness, respect, and equality, which I consider feminist values.

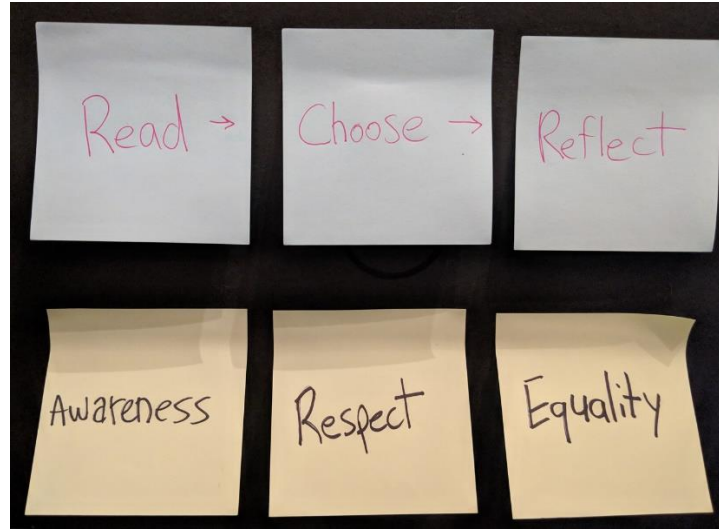


Figure 10: Defining the actions and values of my game using Flanagan's Grow-A-Game deck

The first step was identifying how I wanted to represent gender from the point of view of my future player. In the following diagram, Westecott describes a range of possibilities for gender identification in games. Since my game narrative talks about a postgender world, I identify my game on the gender-free edge of the scale.

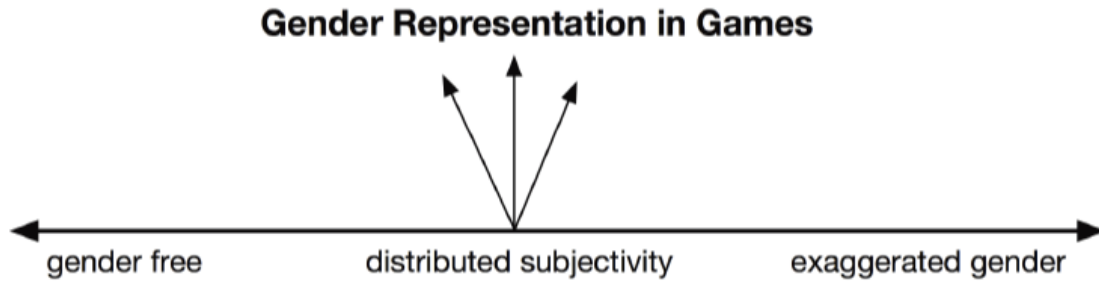


Figure 11: A framework for feminist game studies (Westecott 156)

Following the suggested framework I reviewed in the methodology chapter, I set basic ground rules which helped me structure the feminist aspect of the game:

- Player identity: I chose to place the game player in the second person point of view, addressing them by “you,” which is considered a genderless pronoun.
- The goal of the game: By using a non-linear interactive novel, I made the game about personal choice and was able to achieve the sense of agency I was trying to provide for the game player.
- Animation and body representation: To avoid falling into representational stereotypes of body shapes, I used a uniform body shape for all entities, with no explicit gendered characteristics. I used the colour purple as the intersection between female and male. Moreover, it avoids presenting light coloured people as normative, stating that people are not assumed to be white. I used the more obvious gendered colours such as blue and pink to colour things out of their gender context; for example, male genitals are pink. In addition, the game character does not have any contextual gendered appearance, as they have no hair and wear no clothes that can reveal their gender identity.

- Distributed Subjectivity: By placing the game player in the character's shoes, the neutrois entity who has neither sexual representation nor gendered identity; using animations that step away from clear gender representation; and addressing the game player as "you," I was hoping to create a subjectivity between the game players and their game character.

For the narrative, I used the rules of narrative as proposed by Marie-Laure Ryan as a guideline to the narrative writing (8). The rules are:

- Natural interface. Create an efficient interface that replaces the "symbolic performance of physical actions through the manipulation of controls, and the selection of items from a language-based menu."
- Integrate the game player actions within the story in a way that moves the plot forward.
- Mimic real life by creating frequent interactions, and limit the number of passive moments in which the game player is only observing.
- Aim for the feeling of real-time interaction and development of the plot, emerging from the different variations that were set as part of the narrative.
- Create a "narrative immersion"—"an engagement of the imagination in the mental construction and contemplation of a storyworld." The narrative immersion can take place in three different forms: the sense of the place, anticipation for the next step, and emotional reaction to the story.

Goals

My goal was to create a version of the game that was as close as possible to the final version; but first, I chose to finalize the script and flow.

Process

I divided the work into two processes: develop the narrative and build it using Twine, and create the illustrations. In the first step, I focused on two aspects related to the construction of the narrative: the architecture and script of a story, and the building of the code with Twine, as described in the following diagram. The full process is included as part of the appendix B under the third iteration: narrative writing process.

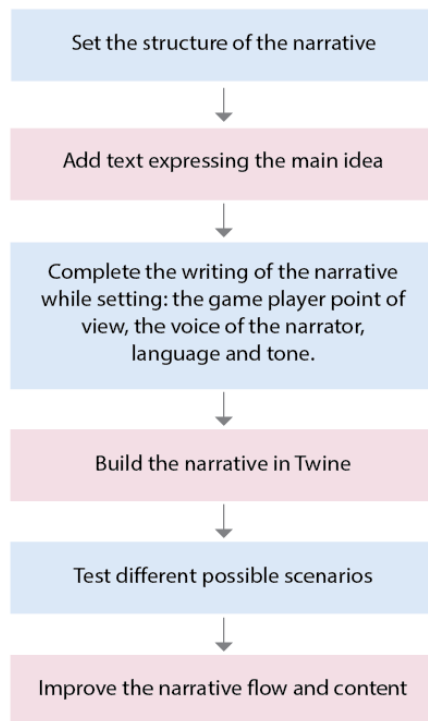


Figure 12: Narrative writing and game creating process

Illustrations

During development, I started working on the illustrations. My original plan did not include adding illustrations to the prototype; but when I reviewed the game, it felt that illustrations would improve the user experience. I added several first draft illustrations to the opening and main screens.

As part of the work on my game, I designed the imaginary future world using two formats—text and illustrations. The game includes 47 illustrations, one per screen, using the visual medium to add information to the world I created—not necessarily to interpret the text—and to give game players more details to envision the world.

I framed my illustrations with feminist ideology, as described as part of the methodology chapter, keeping in mind subjects such as body aesthetics, objectification, ethnicity and gender bias that are often associated with objects.

I started my process with a mood board, using Pinterest, focusing on androgynous body aesthetics for inspiration. I noticed a few patterns that helped me with addressing the body as a performative medium: the absence of physical characteristics such as muscles, body fat, curves, and even hair helped me choose examples that could not be specifically identified as female or male.

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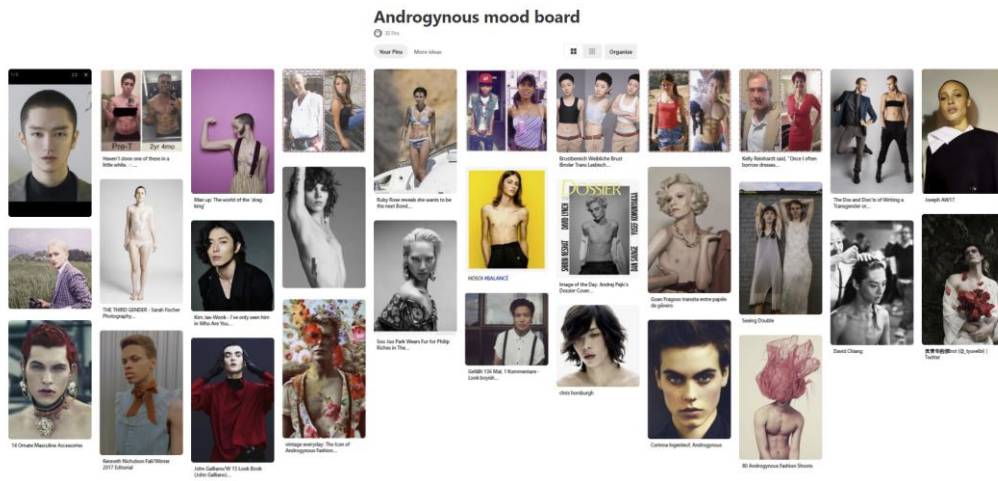


Figure 13: Mood board

I mapped all the game screens and added ideas for possible illustrations. I worked with a mind-mapping technique based on free association to gather ideas.

YES!!!! You can kiss goodbye your 5200 eye serum, yoga classes, and wheatgrass shots. Time means nothing when you get to live forever.

And while you do that, you can dismiss those "right time" life events plans you added to your calendar.

You know, the Education, Career, getting married, Kids, and all these shit. Pardon my French!

Seriously tho, complete freedom, what a life!

Where were we? |

Removal of my SEX WHAT NOW?

Why don't I remember anything?

Who are you?

What is a Neurois Entity?

I've got no questions, thanks.

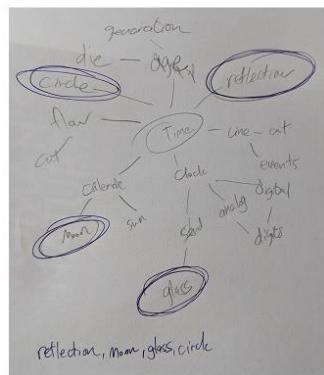


Figure 14: implementing mind-mapping technique

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As I was moving along, I had to step back and reflect on the illustrations as a whole, on the story they tell, and how they contribute to the imagined world.



Figure 15: Illustrations review

I draw my illustrations by hand and scan them to a digital format. I tend not to erase previous traces of pencil lines. As a nostalgic person, I find it more magical to be able to witness the process of creation in this digital age, in which previous versions of artwork are easily deleted from our collective memory and replaced with new and better versions.

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Figure 16: Illustration in the making

The illustrations are coloured in Photoshop. I based my colour palette on variations of pink, blue and purple, colours which often imply a gendered meaning. I used those colours to undermine the game player's visual perception of objects and entities to help break gender stereotypes, and are intended to be ethnically ambiguous.

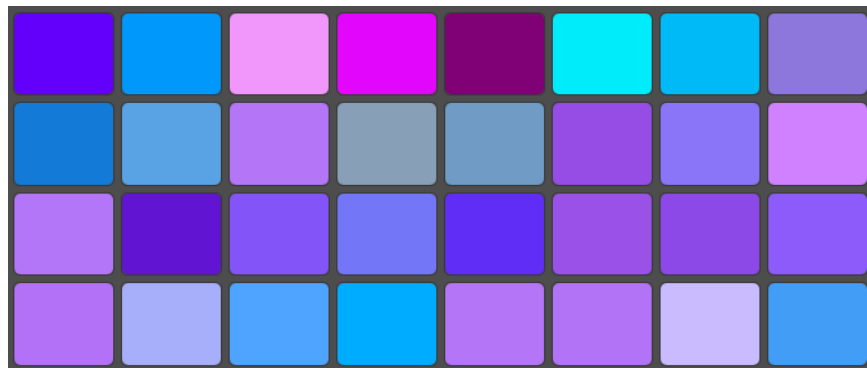


Figure 17: colour palette

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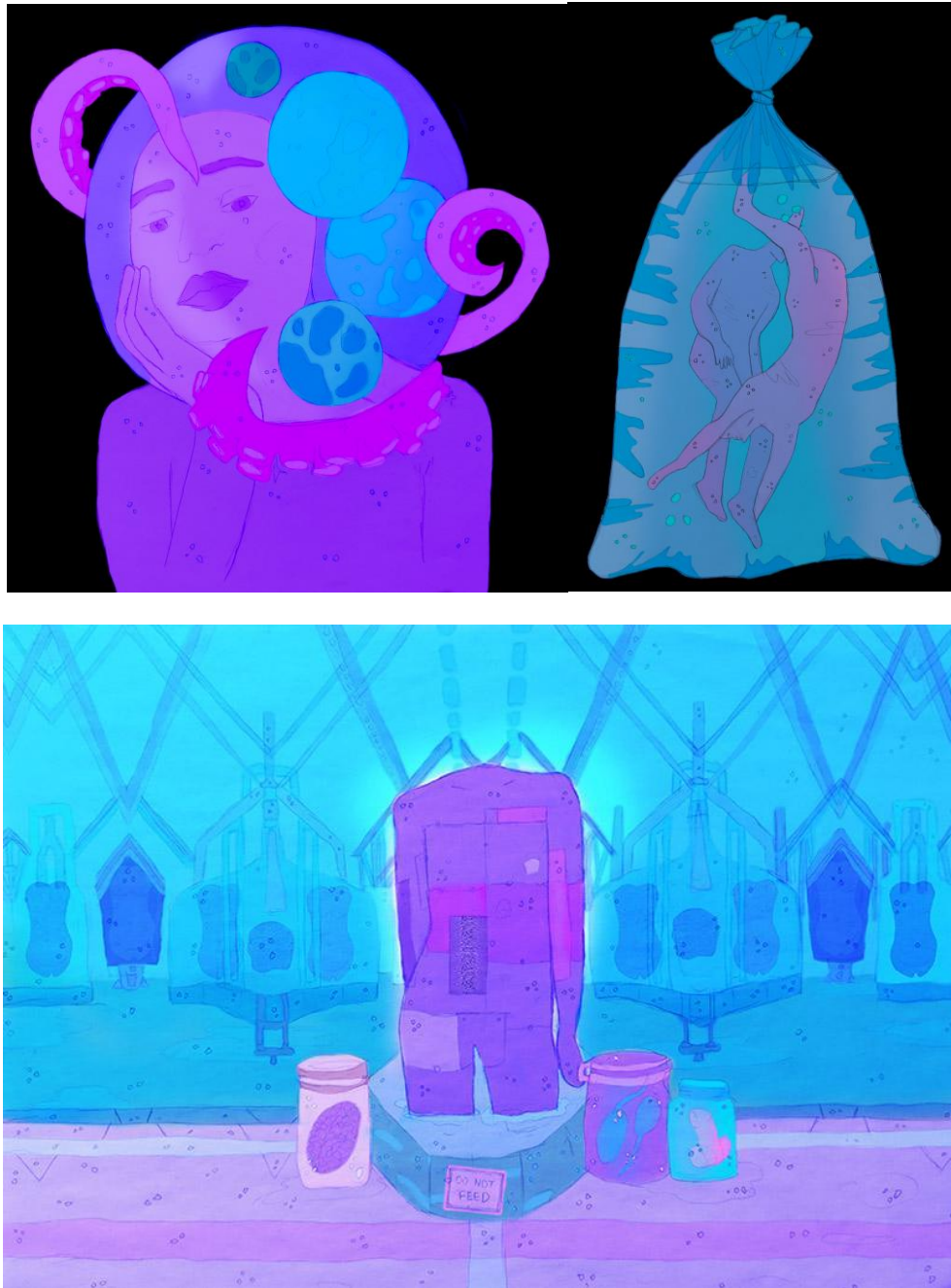


Figure 18: final illustrations

Peer Review

Peer review was conducted as part of the presentation of the prototype. It included several game players who played the game and shared comments on their experience.

The installation included the first fully playable version of the interactive novel presented on a large screen connected to a laptop. Game players had a comfortable seat at a table so they could explore more than one possible path of the game narrative.

As part of the presentation, I included a handout with a short introductory text to provide some background details of the game narrative. I also included some of the illustrations from the game to help game players envision the world they were entering and to spark their curiosity.

As part of the process, I gathered suggestions from the game players and my supervisory team:

- Put more focus on the illustrations - enlarge the size, add animations.
- Use the overall presentation of the game to help the game players build the world around them by taking objects from the digital world into their physical world. This can be done by staging the game display space or adding physical elements from the game.
- Create merchandise: prints, pins, and stickers.
- Think of ways to get people to engage with the game:

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- Neutrois entities corporate website: linked from the endpoints of the game. (On the website, I will provide more information about Neutrois entities and the world, to help game players gain a more comprehensive understanding of the world I created, with details I couldn't include in the narrative. I will also include a FAQ section to give players more information and to encourage further engagement with the game. The information will be used for future development of the game narrative and to expand the game.)
- Build community through social media to suggest ideas and ask questions to help with future development of the narrative.

Documenting

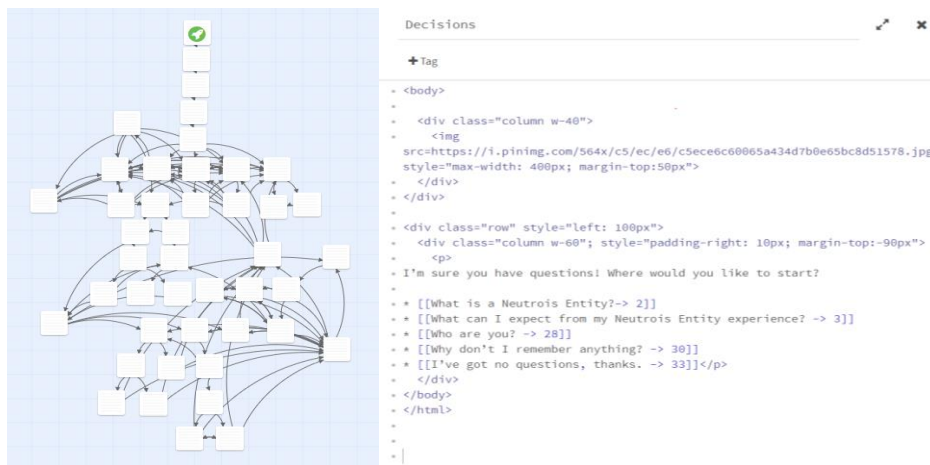


Figure 19: implementing the game narrative in Twine

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Figure 20: peer review

Reflection

The overall feedback I received both from colleagues and supervisors was very satisfying and helpful. All the game players enjoyed the narrative, the tone of voice, and the illustrations; and, more important, the game managed to convey the message and encourage a discussion about the topics I explored in the game narrative.

The game players questioned the influence that gender identities and biological sex have on our lives by comparing everyday situations with the alternatives suggested in the narrative; in particular, situations related to reproduction, sexual partners, and family structure.

The game players underscored the importance of using a funny tone for the narrative, as it helped them accept the narrative more easily. Some also mentioned that the usage of the second-person point of view and the non-sexual representation of the body helped them relate to the new entity presented in the game.

I was happy to witness how the game also encouraged individuals to speculate on other aspects of life that were not included in the narrative. Many of the game players were curious about the feasibility of the game narrative to occur, and they wanted to learn more about the story behind the game.

Since I am interested in developing this project beyond the scope of my thesis, I was important for me to consider ways to develop the game in the future. Therefore, I used the recommendations I received to develop the corporate website that provide additional information about the research behind and helped the game player to engage with the game by asking questions, send comments, and support the development of the game. That also helped with answering the needs of the game players to discover more information about the future world.

Future Work

I estimate that most of my future work will be to complete the illustrations, improve the game experience, and work on the presentation for the final show.

I have divided the work into two sections: “must have” and “nice to have.” Although I have plenty of ideas on how to enrich the game, I prefer to work in layers—start with things I consider necessary to the experience and progress to additional components based on the time I have.

The “must have” list includes the narrative, illustrations, design ideas for the presentation for the final show, and creating further engagement with the game.

- Game narrative: finalize the script, shorten some of the text, and improve two weak points that I discovered while experimenting with the game.
- Illustrations: I already mapped all the game screens and gathered ideas for illustrations for most of the screens. My goal for the final version is to add an illustration to each screen, as I feel the visual element will engage game players with the game. The purpose of the illustrations is not to explain the text, but to add layers of information that will help game players imagine the world they are in. The illustrations are abstract and sometimes surreal in their meanings and can be interpreted in many ways based on one’s experience.
- Final presentation: I am planning to include a large format poster featuring many of the illustrations I created for the game. I will also create stickers and prints of some of the illustrations for game players to take home.

The “nice to have” list includes adding sound, animation, and other effects to the text (code) to enrich the player experience.

This list might change after meeting with my supervisors as I evaluate the time required to add their ideas to the scope of this project.

Fourth Iteration: user experience improvements

Description

For the final iteration of prototyping, I focused on improving the user experience. In this iteration I enhanced the visuals, added sound, and worked on a website that will be connected to the game to provide additional information.

Goals

To enrich the user experience through the use of motion graphics, illustrations, and sounds.
Extend the engagement channels for game players. And finalize the game narrative.

Process

My first stage was to complete the illustrations for all the screens. I continued working with the same creative techniques. Following the comments I received in the last presentation in class, regarding the desire of the game players to engage with the artwork, I decided to address it in

two ways. First, I changed the layout of the illustrations and the text. That way, people who read from left to right can review the illustrations before interacting with the text. Second, I decided to include a reward mechanism for users engaging with the illustrations—motion graphics (animations) only for illustrations that include images of entities. The logic that led to this decision followed my intention to encourage game players to explore their new form of embodiment.

The second improvement was adding a soundtrack and sound effects to the motion graphics. I used the free sound sampling website freesound.org, which is an extensive collaborative database of audio snippets, samples, recordings, and other sound files. My research for game sound focused on creating an emotional experience and arousing curiosity rather than using sound files that directly translate the illustration. For example, I made use of whale calls as an orgasm experience, sounds from a music box for illustrating the quadcopter, and the click sound of dolphins to describe the rotation of the moons to associate it with time.

I completed the work on the narrative. Edited the text on some of the screens to make it more clear.

The work on the website involved gathering all the information I researched before the scenario writing, and re-editing it to online content that should be more inviting. I used Wix.com to create the website. The content focused on providing the backstory for the game narrative to help users put the future world into context. I added a political agenda, scientific data (based on existing scientific research), and an FAQ section to give users additional information on the

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future world. As the primary purpose of the website was to create further user engagement, I focused on adding components that encourage questions that relate to the future world and life as an NE entity. I hope these questions will be used to expand the game narrative in future iterations.

Documenting

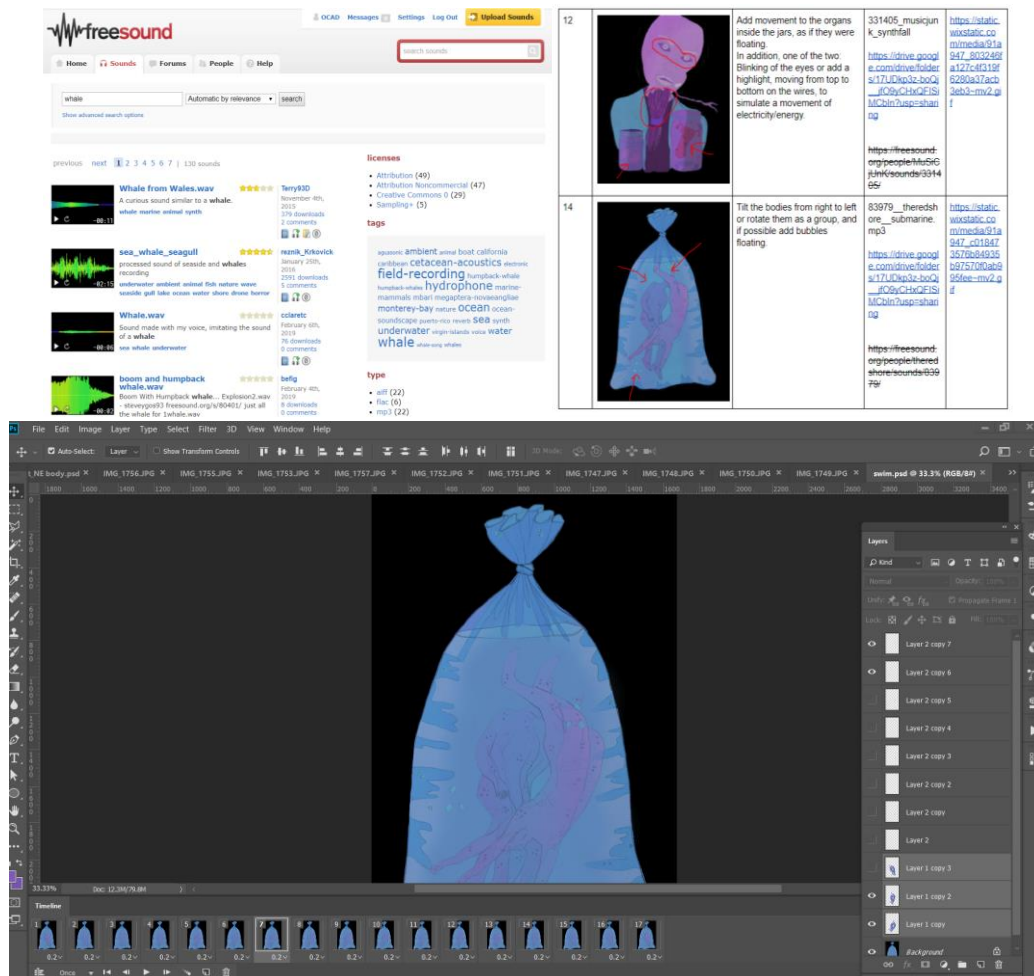


Figure 21: adding animations and sound

THE WORLD GOVERNMENT

Scale: 1:1 Title: NEUTROS ENTITIES (NE) BLUEPRINT

Cellular Diagram Labels:

- Actin Filaments
- Intermediate filaments
- Mitochondria
- Golgi apparatus
- Nucleoplasm
- Vesicles
- Nucleoli
- Cytoplasm
- Endoplasmic reticulum
- Nuclear membrane
- Microtubules
- Plasma membrane
- Centrosome
- Secreted proteins

Protein Size Scale (kDa): 97, 64, 51, 39, 28, 19.

Legend:

- Nucleus:** Nuclear membrane, Nuclear pore, Nucleolus, Nuclear body, Nuclear envelope, Nucleoplasm.
- Cytoplasm:** Actin filaments, Microtubule organizing center, Centrioles, Centrosomes, Microtubule organizing center, Cytoskeleton, Cytoplasmic bridges, Mitochondria, Mitochondrial matrix, Mitochondrial outer membrane, Mitochondrial inner membrane, Mitochondrial cristae, Mitochondrial DNA, Mitochondrial ribosomes, Mitochondrial protein synthesis.
- Intermediate Filaments:** Intermediate filaments, Microfilaments, Cytoskeleton, Cytoskeletal bridge, Microtubule ends, Microtubule ends, Midbody ring, Midbody spindle.
- Mitochondrion:** Mitochondrion, Mitochondrial membrane.
- Secretory:** Endoplasmic reticulum, Golgi apparatus, Golgi cisternae, Plasma membrane, Cell junctions, Plasma membrane.
- Vesicle:** Endosome, Lysosome, Peroxisome, Vesicle, Secreted proteins.

POLYMER-MEDIATED FUNCTIONALISATION OF LIVING MICROSCALE WITH NANOPARTICLES

Name: CCNB1 (HGNC Symbol)
Synonyms: CCNB

Summary:

Since the living cells possess distinctive geometries which to a certain degree follow the shapes of electronic components (i.e. electrodes, wires, etc.) on the microscale, conductive nanoparticle-coated cells were introduced as microcomponents in prototype microelectronic devices. Gold-nanoparticles-functionalised B. cereus bacteria were used as conductive microbridges connecting two gold electrodes deposited on insulating silicon wafers at an average density of 10 bridges along the 10 mm long electrode pair. B. cereus, having an elongated rod-like shape with a high length to width ratio serves as a good microelectrode extension, with a single cell bridging the adjacent electrodes. Chains of several ellipsoid yeast cells can be similarly assembled to serve the same purpose as shown. Microbridges of freshly-attached AuNPs on cells may be better connected to the electrodes via annealing the device under electric field and ambient conditions, which improves the conductivity of microbridges. The geometry of the nanoparticles deposited onto cells is also important, as well as their density. A non-linear current-voltage response recorded using AuNPs on yeast microbridges is attributed to the tunnelling of electrons across the nanoparticle layer. In contrast, microwires fabricated via self-assembly of gold nanoparticles on the fungal hyphae (after the decomposition of organic matter during sporulation extrusion) showed a nearly linear I-current vs. voltage. Bulk gold on fungus microstructures (air-dried thin free-standing films formed from nanoparticle-coated mycelia-microaggregates) may find applications in semiconductor devices since they exhibit an Arrhenius-like temperature dependence, indicating the thermally-activated charge transport between individual AuNPs within the layer. A prototype humidity sensor based on AuNPs on bacterial microbridges was reported, where the humidity change from 20 to 0% induced a 40-fold increase of tunnelling current. Another microelectronic device incorporating graphene on yeast was applied for the differentiation of ethanol, 2-propanol, and water detected during dynamic conductivity decrease caused by reduction in the cellular volume which facilitated straining of the graphene shears and formation of wrinkles.

Chromosome 5 Cytoband q13.2 Chromosome location (bp) 69167010 - 69178243 Ensembl ENSG00000134057 (version 88.38) UniProt P14633 (UniProt - Evidence at protein level) neXtProt NX_P14633 Antibodypedia CCNB1 antibodies

THE WORLD GOVERNMENT

Scale: 1:1 Title: NEUTROS ENTITIES (NE) BLUEPRINT

Organ Labels:

- Brain
- Heart
- Skeletal muscle
- Adrenal gland
- Parathyroid gland
- Thyroid gland
- Lung
- Bone marrow and lymphatic tissues
- Bone marrow
- Lymph node
- Spleen
- Appendix
- Liver
- Gallbladder
- Testis
- Epididymis
- Seminal vesicle
- Prostate
- Adipose tissue
- Gastrointestinal tract
- Salivary gland
- Esophagus
- Stomach
- Duodenum
- Small intestine
- Colon
- Pancreas
- Kidney
- Breast
- Cervix
- Endometrium
- Ovary
- Placenta
- Skin

THE TISSUE AND ORGAN PROTEOMES

The expression for all protein-coding genes in all major tissues and organs in the human body can be explored in this interactive database. Including numerous catalogues of proteins expressed in a tissue-restricted manner.

Legend:

- A (Alanine)
- T (Threonine)
- G (Guanine)
- C (Cytosine)

**ABAXXP Case #1: 10 9
ABAXPGA Case #2: 4 1
ABA Case #3: 8 10
BXA Case #4: 4 1
ABASB Case #5: 6 8
BBASBA Case #6: 2 7**

T (t ± t ± 15)

ABAXXP

ABAXPGA

ABA

BXA

ABASB

BBASBA

Chromosome 5 Cytoband q13.2 Chromosome location (bp) 69167010 - 69178243 Ensembl ENSG00000134057 (version 88.38) UniProt P14633 (UniProt - Evidence at protein level) neXtProt NX_P14633 Antibodypedia CCNB1 antibodies

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Figure 23: Figure 23: website pages

Reflection

I focused on adding sound and animation to enrich the experience of the game. I found that working with other sensory stimuli allowed me to deepen player engagement with the game, thereby allowing the player to explore the narrative in depth.

I chose to animate only those illustrations that directly display the new body, to encourage users to explore the body in more detail. The animation is revealed in a mouse-over of the static illustrations and is a reward mechanism for the player interacting with the game.

Working with sound enabled me to deepen the feelings I wanted to convey in the game. I found that working with sound is a very complex subject and open to personal interpretation. The sounds I chose to use are characterized by elements of water, which connect to the concepts of rebirth and purification.

I hope that linking to an external site where game players can expand their knowledge, ask questions, and make suggestions will help me with future iterations, based on user feedback.

Future Work

I plan to further develop the game by expanding the narrative to touch on more aspects in which neurois entities can experience agency. I am hoping to make use of user suggestions and questions and engage them in the narrative. Other interesting directions might be to work with other women game designers that relate to the topic of my research, or to collaborate with

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emerging futures scholars and designers who are exploring building futures for those usually obscured or silenced in mainstream futures, e.g. LatinX, Indigenous Futures and AfroFutures practitioners.

Chapter 6: Conclusion

My thesis involves a critical discussion of social norms related to sex and gender. Inspired by the postgenderism movement and cyberfeminism ideology, the intent of this thesis is to speculate on a future scenario, written through a feminist lens, to help envision the possibility of technologies of the self—a group of technologies designed to enhance the human body—to be used to liberate humans from the restrictive paradigms of gender norms in the next 50 years.

My research uses a critical approach to future study, speculating on the question “What if our lives could be conducted as if they were free of gender limitations?” My goal was to provide a glimpse at my preferable future—inspired by the postgenderism movement and its agenda—through a scenario, and encourage discussion about the limitations our sexual identity and gender norms put on our lives.

As a 42-year-old, heterosexual, white feminist, who aligns herself with the potential of cyberfeminism ideology, I chose to engage with these theories as part of my work. Addressing my research through a feminist lens allows me as a researcher to move beyond the “relative” identification of women. It pushes the boundaries beyond being equal to men to being a free entity with a strong notion of self and sets the ground for the agency I am seeking to achieve.

My intention for this project was not to aim for gender equality, but to move beyond the social limitations we experience associated with our biological sex. In the frame of my research, the

term *gender equality* becomes problematic as it does not imply the expression of the individual but is rather the alignment of social norms based on patriarchy.

To answer my primary research question, *How might we use technologies of the self to reconsider agency over the next two generations (50 years)?* I integrated speculative design and foresight methodologies to write a science fictioning future scenario. Speculative design methodology helped my research by framing the *what-if* question; however, as a methodology, it does not work with a timeline and so I felt the need to use foresight methodologies for scenario development in my exploration of the future.

I began my exploration with literature review of feminism, postgenderism, technology and critical future, to provide a foundation for scenario writing. During the writing of the literature review I was particularly intrigued by the fact that it will likely take us 108 years to get to gender equality. I was interested to understand the inhibitors and try to tackle them while searching for a possible solution that will help humanity overcome gender. My findings included three main inhibitors: biological sex, the human epistemology, and gender bias that has been transferred to technology. These all motivated my work on the scenario writing process.

My extensive experience in the frame of my thesis, with futures scenarios, led me to the conclusion that in order to overcome the limitations I have as a researcher, and genuinely allow me to “shake off the gender thinking” that is so deeply ingrained in all of us, I must use methodology and methods to push the limits of reason and be creative in my thinking. I chose to practice with speculative design and science fictioning with a time span of fifty years, which

allowed me create a future scenario that is liberated from contemporary limitations and inspired by its creativity.

I consider the future I described in my narrative to be utopic, as it is a representation of my desired future, envisions a postgender world in which all entities experience a strong notion of self. However, I do acknowledge its ambiguously, as for others it might described a dystopic future considering the critical point of view addressing the use of technologies that interfere with the human body, considering issues such as privacy, control, and technology bias.

To answer my second research question, *How might we use future scenarios to stimulate a shift in participants' awareness of the social values related to gendered behaviour?*, I decided to use a game as a medium to make the scenario more accessible to a wider audience. With the words of Stuart Candy in mind—"popularising and demystifying futures" (Candy 234)—I wanted a format would invite game players to interact with the scenario. My goal was to encourage people to use a critical approach and raise awareness of gender limitations.

Digital gaming has moved beyond its designated format of an entertainment medium and has become a legitimate venue to explore social and cultural issues through narrative and design. In a similar way, my interactive novel makes use of the game narrative with illustrations to help envision a postgender world.

I chose to position my game Neutrois under the category of personal games due to the fact that it represents a set of beliefs and values I identify with myself, and because I was involved with

every aspect of the game making. It is also important for me to identify my game as a feminist game designed to subvert common gender archetypes. Many popular digital games created in the last thirty years represented many gender stereotypes, shaping gamers' perception of men—with a masculine, competitive, sports-oriented character, while associating women with being “helpless and sexually provocative” (Fisher 553).

As part of my research, I did not include user testing as a methodology to collect systematic feedback about the game and its feasibility to meet the expectations I set for myself. However, based on peer review, game players indicated that the game made them think critically about situations related to their present lives. They liked the self-awareness perspective of the game and found the alternatives proposed in the narrative potentially applicable to their own lives.

The scenario was positively received and aroused great curiosity among game players. Game players were intrigued by the future presented in the narrative because of its potential to change their lives, and to challenge the social and biological circumstances that limit them to live their lives as they see fit. A recurring question among the game players was about the feasibility of this future to occur, and their understanding of which parts of it are “real” and which are “fiction.”

It is important to acknowledge that the feedback I received was based on a peer review and not as part of a user testing process, therefore, it is missing the academic rigor. A proper user testing might be conducted as part of future development of this research.

Future work may include expanding the game by adding layers to the narrative to explore further implications of the agency we have over our lives. It may also develop into a transmedia project, using other platforms such as a book, board game, or deck of cards, to examine the effectiveness of other formats to convey the same message. I intend to continue this research beyond the scope of my thesis as I have come to recognize its importance and contribution to a matter that is deeply close to my heart.

I hope my research will contribute to the growing field of futures games and social futurism, as a case study of how to make use of gaming as a medium to address and explore social and cultural issues, and as a platform to further explore foresight as a way to inspire global change. I also hope my work will inspire other women game designers to create new games on their own, or to collaborate with emerging futures scholars and designers who are exploring building futures for those usually obscured or silenced in mainstream futures, e.g. LatinX, Indigenous Futures and AfroFutures practitioners.

Bibliography

Search terms: Gender, Feminism, Queer theory, Social body, Postgender future, Posthuman, Posthumanism, Postgenderism, Biohacking, Cyborg, Technological bodies, Speculative design, Foresight, Narrative, Game design.

Ahmed, Sara. *The Cultural Politics of Emotion*. Routledge, 2012.

Alba, Beatrice. "To Achieve Gender Equality, We Must First Tackle Our Unconscious Biases." *The Conversation*, The Conversation, 17 June 2018, theconversation.com/to-achieve-gender-equality-we-must-first-tackle-our-unconscious-biases-92848.

Anderson, R., and C. E. Jones. *Afrofuturism 2.0: The Rise of Astro-Blackness*. 2016.

Auger, James. "Speculative Design: Crafting the Speculation." *Digital Creativity*, vol. 24, no. 1, 2013.

Bailey, Jon. "Posthumanism, Cyborgs Interconnected Bodies." *Archimorph*, 6 Apr. 2011, archimorph.com/2011/04/05/posthumanism-cyborgs-interconnected-bodies/.

Beauvoir, Simone d. *The Second Sex*. Modern Library, New York, 1993.

Belman, Jonathan, et al. "Instructional Methods and Curricula for Values Conscious Design." *Loading: The Official Journal of the Canadian Games Studies Association*, vol. 3.4, 2009, tiltfactor.org/wp-content/uploads2/Instructional-Methods-and-Curricula.pdf.

Bishop, Peter, et al. "The Current State of Scenario Development: an Overview of Techniques." *Foresight*, vol. 9, no. 1, 2007, pp. 5–25., doi:10.1108/14636680710727516.

Blackman, Lisa. *The Body: The Key Concepts*. Berg, Oxford; New York; 2008.

Bleecker, J(2009). *Design Fiction: A Short Essay on Design, Science, Fact and Fiction*.

Retrieved November 21, 2011, from <http://www.nearfuturelaboratory.com/2009/03/17/design-fiction-a-short-essay-on-design-science-fact-and-fiction/>.

Butler, Judith. "Performative Acts and Gender Constitution: An Essay in Phenomenology and Feminist Theory." *Performing Feminisms: Feminist Critical Theory and Theatre*. Ed. Sue-Ellen Case. Baltimore: Johns Hopkins UP, 1990.

Braidotti, Rosi. *The Posthuman*. Polity, Cambridge, 2013.

Breaking Down Gender Barriers to Build the Future Tech Workforce. ISACA, 2017, *Breaking Down Gender Barriers to Build the Future Tech Workforce*, www.isaca.org/SiteCollectionDocuments/Breaking-Gender-Barriers_res_eng_0317.PDF.

Brooks, Lonny J Avi. "Playing a Minority Forecaster in search of Afrofuturism: where am I in this future, Stewart Brand?" Culture Digitally, 20 Jan. 2014, culturedigitally.org/2014/01/playing-a-minority-forecaster-in-search-of-afrofuturism-where-am-i-in-this-future-stewart-brand/.

Candy, Stuart, and Riel Miller. "Gaming Futures Literacy: The Thing From The Future." *Transforming the Future Anticipation in the 21st Century*, 1st ed., Routledge / UNESCO, 2018, pp. 233–246.

Carastathis, Anna. "The Concept of Intersectionality in Feminist Theory." *Philosophy Compass*, vol. 9, no. 5, 2014, pp. 304-314.

Collier, Ken. *Agile analytics: A value-driven approach to business intelligence and data warehousing*. Addison-Wesley, 2012, pp. 3-4.

Consalvo, Mia. "Cyberfeminism." *Encyclopedia of New Media*. Ed. Steve Jones. Thousand Oaks: SAGE Publications, Inc., 2003. 108-109. *SAGE Knowledge*. Web. 5 Feb. 2019, doi: 10.4135/9781412950657.n57.

CBC Radio. "Indigenous Virtual Reality: An Experiment in 'Indigenization of Cyberspace.'" *CBC News*, CBC, 31 Oct. 2018, www.cbc.ca/radio/unreserved/indigenous-virtual-reality-an-experiment-in-indigenization-of-cyberspace-1.4654306.

Cuboniks, Laboria. "Xenofeminism." *Laboria Cuboniks*, www.laboriacuboniks.net/#zero.

Cruz, Eduardo R. "transhumanism and the Fate of Natality: An Introduction." *Zygon*, vol. 48, no. 4, 2013, pp. 916-935.

Davies, Bronwyn. "THE CONCEPT OF AGENCY: A Feminist Poststructuralist Analysis." *Social Analysis: The International Journal of Social and Cultural Practice*, no. 30, 1991, pp. 42-53.

Dator, Jim. "WHAT FUTURES STUDIES IS, AND IS NOT." *Futures.hawaii.edu*, www.futures.hawaii.edu/publications/futures-studies/WhatFSis1995.pdf.

David. "Event: EROS EVOLVING - THE FUTURE OF LOVE, SEX, MARRIAGE and BEAUTY (Produced by TRANSHUMAN VISIONS)." *h Media*, 27 Mar. 2014, hplusmagazine.com/2014/03/27/event-eros-evolving-the-future-of-love-sex-marriage-and-beauty-produced-by-transhuman-visions/.

Desai, Murli. "Feminism and Policy Approaches for Gender Aware Development." *The Paradigm of International Social Development*. Routledge, 2013. 129-152.

Duda, Igor, and Robert Kurelić. "Introduction—Identity in Flux." *Tabula: časopis Filozofskog fakulteta, Sveučilište Jurja Dobrile u Puli* 14 (2016): 1-3.

- Dvorsky, George. "Gender Will Become Obsolete." *Male and Female Roles: Opposing Viewpoints*, by Karen Miller, Detroit, MI: Greenhaven Press, 2010.
- Dworkin, Andrea. "Occupation." *Intercourse*, 1987,
www.nostatusquo.com/ACLU/dworkin/Intercourse.html.
- Dunne Anthony, Fiona Raby. *Speculative Everything: Design, Fiction, and Social Dreaming*. The MIT Press, Cambridge, Mass, 2013; 2014.
- Durie, Mason. *Ngā kāhui Pou Launching Māori Futures*. Huia, 2003.
- Eveleth, Rose. "FlashForward." *Flash Forward*, Gizmodo.com, 2015,
www.flashforwardpod.com/.
- Fausto-Sterling, Anne. *Sexing the Body: Gender Politics and the Construction of Sexuality*. Basic Books, New York, 2000.
- Firestone, Shulamith. *The Dialectic of Sex: The Case for Feminist Revolution*. Paladin, London, 1972.
- Fisher, Howard D. "Sexy, Dangerous—and Ignored: An in-Depth Review of the Representation of Women in Select Video Game Magazines." *Games and Culture*, vol. 10, no. 6, 2015, pp. 551-570.
- Ferrando, Francesca. "Is the Post-Human a Post-Woman? Cyborgs, Robots, Artificial Intelligence and the Futures of Gender: A Case Study: Doc 43." *European Journal of Futures Research*, vol. 2, no. 1, 2014.
- "Intersex." www.unfe.org, United Nation Human Rights Office of the High Commissioner,
www.unfe.org/wp-content/uploads/2018/10/Intersex-English.pdf.
- Flanagan, Mary. *Critical Play: Radical Game Design*. MIT Press, London; Cambridge, Mass., 2009.

- Flanagan, Mary, and Helen Nissenbaum. *A Game Design Methodology to Incorporate Social Activist Themes*, ACM, 2007, doi:10.1145/1240624.1240654.
- Foucault, Michel. "Technologies of the Self." *Michel Foucault, Info.*, Michel Foucault, Info., 1 Oct. 1982, pp.16-49. foucault.info/documents/foucault.technologiesOfSelf.en/.
- Glenn, Jerome C. *Futures Research Methodology Version 3.0*. The Millennium Project, 2009.
- Gordon, Adam. *Future Savvy Identifying Trends to Make Better Decisions, Manage Uncertainty, and Profit from Change*. American Management Association, 2009, p. 136.
- Grosz, Elizabeth A. *Space, Time, and Perversion: Essays on Feminism after the Death of the Author*. Routledge, 1995.
- Hayles, N. Katherine. "Conclusion: What Does It Mean To Be Posthuman?" *How We Became Posthuman: Virtual Bodies in Cybernetics, Literature, and Informatics*. University of Chicago Press, 1999.
- . "Liberal Subjectivity Imperiled: Norbert Wiener and Cybernetic Anxiety." *How We Became Posthuman: Virtual Bodies in Cybernetics, Literature, and Informatics*. University of Chicago Press, 1999.
- . "Technologies of the Gendered Body: Reading Cyborg Women." *Contemporary Literature*, vol. 38, no. 4, 1997, p. 755. *Academic OneFile*, <http://link.galegroup.com/apps/doc/A20207631/AONE?u=toro37158&sid=AONE&xid=969ba96a>. Accessed 16 Oct. 2018.
- Holt, Macon. "What Is Xenofeminism?" *Ark Books*, 13 Feb. 2018, arkbooks.dk/what-is-xenofeminism/.
- Ice, Valkyrie. "Best of H+: Total Gender Change within a Decade." *Hplusmagazine.com*, Humanity, 8 May 2014, hplusmagazine.com/2014/05/08/total-gender-change-within-decade/.

Inayatullah, Sohail. *Questioning the Future: Methods and Tools for Organizational and Societal Transformation*. Tamkang University, 2007.

Inayatullah, Sohail. "Six Pillars: Futures Thinking for Transforming." *Foresight*, vol. 10, no. 1, 2008, pp. 4–21., doi:10.1108/14636680810855991.

Robinson, John Bridger. "Energy Backcasting A Proposed Method of Policy Analysis." *Energy Policy* 10.4 (1982): 337–344. Web.

Johnson, Brian David. *Science Fiction Prototyping Designing the Future with Science Fiction*. Morgan & Claypool, 2011.

Kember, Sarah. "Notes Towards a Feminist Futurist Manifesto." *Ada: A Journal of Gender, New Media, and Technology*, no. 1, adanewmedia.org/2012/11/issue1-kember/.

Lowe, Marian, and Ruth Hubbard. "The Dialectic of Biology and Culture." *Woman's Nature Rationalizations and Inequality*, edited by Marian Lowe, Pergamon Press Inc., 1986, pp. 39–62.

Garreau, Joel. *Radical Evolution: the Promise and Peril of Enhancing Our Minds, Our Bodies--and What It Means to Be Human*. Broadway, 2006.

Gender Equality in Codes of Conduct Guidance. BSR, *Gender Equality in Codes of Conduct Guidance*, www.bsr.org/reports/BSR_Gender_Equality_in_Codes_of_Conduct_Guidance.pdf.

Georghiou, Luke. *A Handbook of Technology Foresight: Concepts and Practice*. Edward Elgar, 2009.

Gilmore, Amir A. "Afrofuturism 2.0: The Rise of Astro-Blackness." *The Western Journal of Black Studies*, vol. 41, no. 3-4, 2017.

Godwin, Richard. "Men after #MeToo: 'There's a Narrative That Masculinity Is Fundamentally Toxic.'" *The Guardian*, Guardian News and Media, 9 Mar. 2018, www.theguardian.com/world/2018/mar/09/men-after-metoo-masculinity-fundamentally-toxic.

Green, Jonathan D. and Matthew Jakupcak. "Masculinity and Men's Self-Harm Behaviors: Implications for Non-Suicidal Self-Injury Disorder." *apa.org*, APA, Apr. 2016,

<http://www.apa.org/pubs/journals/features/men-a0039691.pdf>.

Haraway, Donna. "A Cyborg Manifesto: Science, Technology, and Socialist-Feminism in the Late Twentieth Century." *Simians, Cyborgs, and Women: The Reinvention of Nature*.

Routledge, 1991.

Hayles, N. Katherine. "Technologies of the Gendered Body: Reading Cyborg Women."

Contemporary Literature, vol. 38, no. 4, 1997, p. 755. *Academic OneFile*,

<http://link.galegroup.com/apps/doc/A20207631/AONE?u=toro37158&sid=AONE&xid=969ba96a>

. Accessed 20 Oct. 2018.

Johnson, Joy L. and Robin Repta. "Sex and Gender: Beyond the Binaries." *Designing and Conducting Gender, Sex, & Health Research*. Eds. John L. Oliffe and Lorraine Greaves.

Thousand Oaks: SAGE Publications, Inc., 2012. pp. 17-38. *SAGE Knowledge*. Web. 16 Oct. 2018, doi: 10.4135/9781452230610.n2.

Kilbourne, William, and Susan Weeks. "A Socio-Economic Perspective on Gender Bias in Technology." *Journal of Socio-Economics*, vol. 26, no. 3, 1997.

Leitch, Alex. *Mechanism: An artist-led, feminist design process for open technology tools*.

Masters thesis, OCAD University, 2014.

Le Guin, Ursula Kroeber. *The Left Hand of Darkness*. Virago Press, 1999.

Lerner, Gerda. *The Creation of Patriarchy: Gerda Lerner*. Oxford University Press, New York, 1986.

Lloyd, Moya. *Judith Butler: From Norms to Politics*. Polity, Malden, MA; Cambridge, UK, 2007.

Luppicini, Rocci. *Handbook of Research on Technoself: Identity in a Technological Society*.

Information Science Reference, 2013.

Malatino, Hilary. "Biohacking Gender." *Angelaki*, vol. 22, no. 2, 2017.

Martin, Michel. "Star Trek's Uhura Reflects on MLK Encounter." National Public Radio, 2011.

Maxwell, Karen, Segal, Shannah. *The Next Familiar*. Masters thesis, OCAD University, 2015.

McGonigal, Jane. *Reality Is Broken: Why Games Make Us Better and How They Can Change the World*. London: Penguin, 2011.

Medak-Saltzman, Danika. "Coming to You from the Indigenous Future: Native Women, Speculative Film Shorts, and the Art of the Possible." *Studies in American Indian Literatures*, vol. 29, no. 1, 2017, pp. 139-171.

Mercer, Calvin. "Bodies and Persons: Theological Reflections on Transhumanism." *Dialog*, vol. 54, no. 1, 2015.

Meyers, Diana T. *Subjection and Subjectivity Psychoanalytic Feminism and Moral Philosophy*. Taylor and Francis, 2014.

Mikkola, Mari. "Feminist Perspectives on Sex and Gender." *Stanford Encyclopedia of Philosophy*, Stanford University, 25 Oct. 2017, plato.stanford.edu/entries/feminism-gender/#SexDis.

Mill, John Stuart. *SUBJECTION OF WOMEN*. ARCTURUS, 2019.

Minoo, Alinia, Södertörns högskola, and Institutionen för samhällsvetenskaper. "On Black Feminist Thought: Thinking Oppression and Resistance through Intersectional Paradigm." *Ethnic and Racial Studies*, vol. 38, no. 13, 2015, p. 2334.

Moura-Kocoglu, Michaela. "Decolonizing Gender Roles in Pacific Women's Writing: Indigenous Feminist Theories and the Reconceptualization of Women's Authority." *Contemporary Women's Writing*, vol. 11, no. 2, 2017, p. 239.

Mulvey, Laura. "Visual Pleasure and Narrative Cinema." *Film Theory and Criticism: Introductory Readings*. Eds. Leo Braudy and Marshall Cohen. New York; Oxford UP, 1999, pp. 833-44.

Women and the Web. Intel Corporation, 2012, *Women and the Web*,

www.intel.com/content/dam/www/public/us/en/documents/pdf/women-and-the-web.pdf.

"Women Deserve Equal Pay." *National Organization for Women*, now.org/resource/women-deserve-equal-pay-factsheet/.

Ortner, Sherry B. "Is Female to Male as Nature Is to Culture?" *Woman, Culture, and Society*, edited by M. Z. Rosaldo and L. Lamphere, Stanford, CA: Stanford University Press, 1974, pp. 68–87.

Ostler, Blaire. "Feminism Meets Transhumanism." *Blaire Ostler*, 25 Apr. 1970,

www.blaireostler.com/journal/2018/4/25/feminism-meets-transhumanism.

"Overview of Methodologies." OECD,

www.oecd.org/site/schoolingfortomorrowknowledgebase/futuresthinking/overviewofmethodologies.htm.

Parkhurst, Aaron. "Becoming Cyborgian." *The New Bioethics: A Multidisciplinary Journal of Biotechnology and the Body*, vol. 18, no. 1, 2012.

Poli, Roberto. "Steps Toward an Explicit Ontology of the Future." *Journal of Futures Studies*, Sept. 2011, pdfs.semanticscholar.org/0294/5386f7e88e2344d5dad6da40de623f22bf14.pdf.

Ramos José M. *From Critique to Cultural Recovery: Critical Futures Studies and Causal Layered Analysis*. Australian Foresight Institute, Swinburne University of Technology, 2003.

Re, Lucia. "Futurism and Feminism." *Annali D'Italianistica*, vol. 7, 1989, pp. 253–272. JSTOR, www.jstor.org/stable/24003870.

Rhydderch, Alun. "Scenario Planning Guidance Note." *Nationalarchives.gov.uk*, London: Government Office for Science, 2009, webarchive.nationalarchives.gov.uk/20120306030555/http://www.bis.gov.uk/assets/bispartners/foresight/docs/horizon-scanning-centre/foresight_scenario_planning.pdf.

Ryan, Marie-Laure. "Interactive Narrative, Plot Types, and Interpersonal Relations." Lecture Notes in Computer Science (2008): 6–13. Web.

Wallman, James. "How to analyse the macro-environment." thefish.co, <http://thefish.co/read-any-macroenvironment/>

Walton, Heather. "The Gender of the Cyborg." *Theology & Sexuality*, vol. 10, no. 2, 01/2004, pp. 33-44, doi:10.1177/135583580401000203.

Wells, Paul. *Understanding Animation*. Routledge, 1998.

Westecott, Emma. "Performing Play in Digital Games: Mapping Feminist Futures." *University of South Wales*, 2015.

Willett, Anderson, Meyers. "Feminist Perspectives on the Self." *Stanford Encyclopedia of Philosophy*, Stanford University, 28 June 1999, plato.stanford.edu/entries/feminism-self/.

Wissema, Johan. "Fear of Change? A Myth." *Journal of Change Management*, vol. 1, no. 1, 2000, pp. 1-10.

Wissinger, Elizabeth. "Wearable Tech, Bodies, and Gender." *Sociology Compass*, vol. 11, no. 11, 2017, pp. 461-480.

Senft, Theresa. "Reading Notes on Donna Haraway's 'Cyborg Manifesto.'" *APPROACHES GLS, CCCPSENFT*, 2001, <http://cccpapproaches.weebly.com/cyborg-manifesto-notes.html>.

Sherif, Taalab. *Women & Visible Minority Representation in Videogames*. DF. OCAD University 2015.

Simpson, Leanne Betasamosake. *Dancing on our turtle's back: Stories of Nishnaabeg re-creation, resurgence and a new emergence*. Arbeiter Ring Pub., 2011.

Smith, Zoe. "Technological Bodies: Feminist Cyborg Constructions." *Convergence: The International Journal of Research into New Media Technologies*, vol. 3, no. 2, 1997.

Slaughter, Richard A. "A New Framework for Environmental Scanning." *The Journal of Futures Studies, Strategic Thinking and Policy*, vol. 1, no. 5, Oct. 1999, pp. 441–451.

"The Global Gender Gap Report 2017." World Economic Forum, 2017, www.weforum.org/reports/the-global-gender-gap-report-2017.

Richard Lum and Michele Bowman. vision foresight strategy. "Verge: a General Practice Framework for Futures Work." *Visionforesightstrategy.wordpress.com*, 15 Sept. 2014, visionforesightstrategy.wordpress.com/2014/09/15/verge-a-general-practice-framework-for-futures-work/.

Voros, Joseph. "A Generic Foresight Process Framework." *Foresight*, vol. 5, no. 3, 2003, pp. 10–21., doi:10.1108/14636680310698379.

Wajcman, Judy. "Feminist Theories of Technology." *Cambridge Journal of Economics*, vol. 34, no. 1, 2010, pp. 143-152.

Wark, Jayne. *Radical Gestures: Feminism and Performance Art in North America*. Montreal & Kingston: McGill-Queen's University Press, 2006.

Webb, Amy, et al. *2018 Tech Trends Report*. Future Today Institute, *2018 Tech Trends Report*, futuretodayinstitute.com/2018-tech-trends-annual-report/.

Westfahl, Gary, editor. "Feminism", *The Greenwood Encyclopedia of Science Fiction and Fantasy: Themes, Works, and Wonders*, by Elyce Rae Helford, Greenwood Press, 2005, pp. 289–291.

Wheturangi, Walsh-Tapiata. "The Past the Present and the Future: The New Zealand Indigenous Experience of Social Work." <https://Anzasw.nz/>, Asssss Aotearoa New Zealand Association of Social Workers, [anzasw.nz/wp-content/uploads/Social-Work-Review-16-Summer-04-Article-Walsh-Tapiata.pdf](https://Anzasw.nz/wp-content/uploads/Social-Work-Review-16-Summer-04-Article-Walsh-Tapiata.pdf).

Appendix

Appendix A: Foresight work

Future wheel



Figure 24: Future Wheel of Amy Webb's 2018 "Tech Trends Report"

Moving Toward Agency. How Technology of the Self can Liberate Humans from the Social Constraints of Biological Sex.



Figure 25: Future Wheel of Valkyrie Ice's article "Best of H+: Total Gender Change within a Decade"

Moving Toward Agency. How Technology of the Self can Liberate Humans from the Social Constraints of Biological Sex.

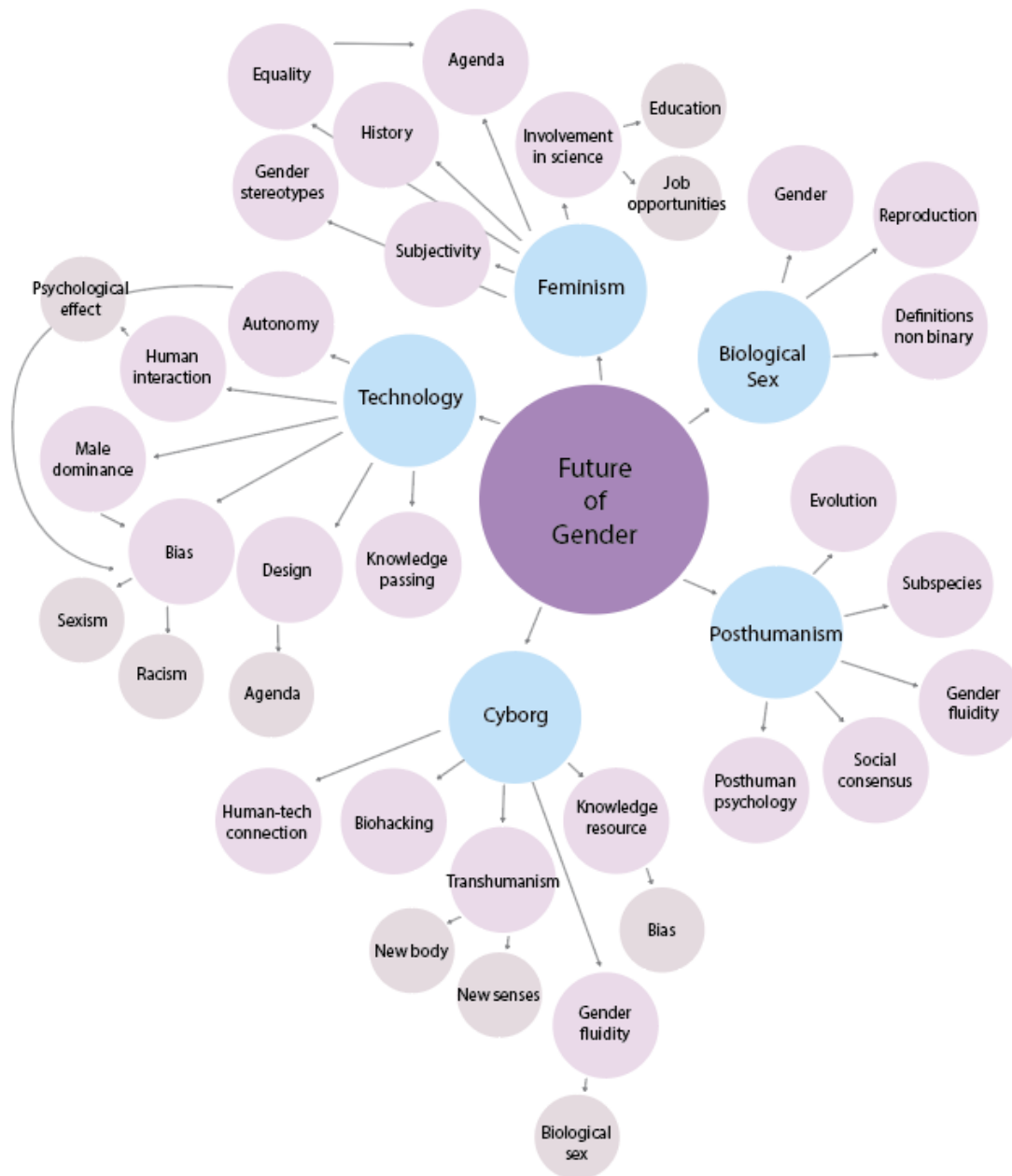


Figure 26: Future Wheel of Francesca Ferrando's article "Is the Post-Human a Post-Woman? Cyborgs, Robots, Artificial Intelligence and the Futures of Gender: A Case Study"

Moving Toward Agency. How Technology of the Self can Liberate Humans from the Social Constraints of Biological Sex.



Figure 27: Future Wheel of Hilary Malatino's article "Biohacking gender"

Trends and Drivers

Drivers

- **Transhumanism (H+)**

Aims to transform the human condition by developing and making widely available sophisticated technologies to greatly enhance human intellect and physiology.

Transhumanism supports diversity in the form of embodiment, which is critical to the deconstruction of both the physical and social human body.¹³

- **Female leadership**

The social agenda that helps females break the glass ceiling and enter key positions as managers, leaders, and entrepreneurs. Females as role models are essential to inspire next generations.¹⁴

- **Postgenderism**

A social philosophy which seeks to reduce gender differences in humans through the use of advanced biotechnologies. Postgenderism uses technology to overcome physical differences between females and males, blurring the boundaries between the physical bodies. Transhumanism also challenges social values such as binary and heteronormative that undermine the concept of gender.¹⁵

¹³ Malatino, Hilary. "Biohacking Gender." *Angelaki*, vol. 22, no. 2, 2017, pp. 179-190.

¹⁴ *Gender Equality in Codes of Conduct Guidance*. BSR, *Gender Equality in Codes of Conduct Guidance*, www.bsr.org/reports/BSR_Gender_Equality_in_Codes_of_Conduct_Guidance.pdf.

¹⁵ Ice, Valkyrie. "Best of H+: Total Gender Change within a Decade." *Hplusmagazine.com*, Humanity, 8 May 2014, hplusmagazine.com/2014/05/08/total-gender-change-within-decade/.

- **Cyborg**

Hybridism of technology with the human body. Includes a wide range of body-related technologies such as neurotechnology, biotechnology and reproductive technologies to enhance the human condition.¹⁶

- **Human-machine interaction**

The study of the interaction between humans and machines. Some of the issues considered problematic are male dominance, gender bias, and gender roles, which may be apparent in current technologies, as those are mostly designed by males.¹⁷

- **Embracing zero tolerance policy**

Increase in awareness of gender-related issues such as harassment and sexism. Supported by regulations, and organizations such as workplaces, education institutes, and public places, denouncing harassment of any kind.¹⁸

Trends

Environmental

- **E-friendly technology**

Technologies which can reduce damage to our environment and public health.¹⁹

¹⁶ Malatino, pp. 179-190.

¹⁷ Malatino, pp. 179-190.

¹⁸ Alba, Beatrice. "To Achieve Gender Equality, We Must First Tackle Our Unconscious Biases." *The Conversation*, The Conversation, 17 June 2018, theconversation.com/to-achieve-gender-equality-we-must-first-tackle-our-unconscious-biases-92848.

¹⁹ Rogers, S.A. "What Is Eco-Friendly Technology?" *MNN - Mother Nature Network*, Mother Nature Network, 5 June 2017, www.mnn.com/green-tech/computers/stories/what-is-eco-friendly-technology.

- **The rise of the maker movement**

The maker movement, as part of the local social-sharing economy, affects the environment by reducing air pollution and the need for travel, and, encourages people to use fewer materials and create less waste.²⁰

- **Cost of digital**

Technology advancements bring more than financial losses; they also create stresses on the environment by using critical resources such as energy and water.²¹

- **Tech health hazards**

Concern about the effect technology has on our health. Mobile phone radiation and toxic materials such as plastic and metals are considered health hazards and can damage fertility.²²

- **Dematerialization**

As technologies improve, we aim to reduce the amount of material it takes to improve the capacity and performance of new tools. Technology is getting smaller, lighter, more portable, more economical (regarding the materials it takes to produce it), and softer in environmental impact.²³

²⁰ Webb, Amy, et al. *2018 Tech Trends Report*. Future Today Institute, *2018 Tech Trends Report*, futuretodayinstitute.com/2018-tech-trends-annual-report/.

²¹ Stein, Suzanne. "Tati Trend Deck." OCAD University, Super Ordinary Lab, Toronto, 25 June 2018.

²² Stein.

²³ Stein.

Political

- **Gender activism**

People who recognize gender gaps as a social issue and act to reduce them through promoting awareness and regulations.²⁴

- **Privacy concerns**

Body modifications and medical procedures documented by technologies raise concerns about privacy and confidentiality of such sensitive information.²⁵

- **Feminist technology**

The advancement of females to key positions in science and technology, to enable the agenda of technologies developed by both females and males.²⁶

- **Toxic masculinity**

Activism movement raising awareness of traditional cultural masculine norms in society that can be harmful to males, females, and society overall, as a result of masculinity stereotypes.²⁷

²⁴ *Gender Equality in Codes of Conduct Guidance*.

²⁵ Eveleth, Rose. "Flash Forward." *Flash Forward*, Gizmodo.com, 2015, www.flashforwardpod.com/.

²⁶ Malatino, pp. 179-190.

²⁷ Godwin, Richard. "Men after #MeToo: 'There's a Narrative That Masculinity Is Fundamentally Toxic.'" *The Guardian*, Guardian News and Media, 9 Mar. 2018, www.theguardian.com/world/2018/mar/09/men-after-metoo-masculinity-fundamentally-toxic.

Values

- **Dreams of immortality**

The constant need for self-improvement to overcome biological and physical flaws, live longer, and overcome weaknesses through the use of technologies.²⁸

- **Humans playing god**

In contrast to the religious belief that man was created in the image of God, technologies enable improvement of the human body and even the creation of cells, tissues, and organs under laboratory conditions.²⁹

- **Gender stereotypes**

We become more aware of gender stereotypes and try to shatter them by supporting more liberal social values.³⁰

- **Gender bias**

Gender bias (conscious or unconscious) is inherent in our social values, and therefore also integrated into the technologies we design.³¹

- **Gender discrimination**

Discrimination based on gender (or sex) is considered a civil rights violation. It takes many forms, including sexual harassment, pregnancy discrimination, and unequal pay for females who do the same jobs as men.³²

²⁸ Malatino, pp. 179-190.

²⁹ Ice.

³⁰ Alba.

³¹ Alba.

³² *Gender Equality in Codes of Conduct Guidance*.

Economic

- **Sharing Economy**

Contribute to female empowerment by providing opportunities and encouraging entrepreneurship.³³

- **Recruitment bias**

Artificial intelligence used in the recruitment process prevents equal opportunity, as it is influenced by gender bias, which prioritizes males over females.³⁴

- **Tech obsession**

Rapid developments and the growing demands of new technologies increase the need for new materials and methods, which creates more economic opportunities.³⁵

Social

- **Tech accessibility**

The availability of technology to people from different economic classes and less developed countries. Greater availability will enable faster progress toward reducing gender and social gaps.³⁶

- **Life expectancy**

An increase in life expectancy as technology helps to improve the human body by preventing disease and aging.³⁷

³³ Webb, et al.

³⁴ *Gender Equality in Codes of Conduct Guidance*.

³⁵ Webb, et al.

³⁶ *Gender Equality in Codes of Conduct Guidance*.

³⁷ Ferrando, Francesca. "Is the Post-Human a Post-Woman? Cyborgs, Robots, Artificial Intelligence and the Futures of Gender: A Case Study: Doc 43." *European Journal of Futures Research*, vol. 2, no. 1, 2014.

- **The connectivity paradox**

Although technology is designed to increase the ability to communicate, we feel more disconnected as human interaction increasingly moves from physical to virtual.³⁸

- **Identity in Flux**

Identity might be very fluid and changeable, and it can have different layers: age, race, gender, ethnicity, religion, geography, education, political inclinations and so on.³⁹ The question of self-definition: how do we define ourselves through the connections between technology, our body (physical and social), and social norms?⁴⁰

- **Human-centered design (behavioural science)**

Understanding people and their needs when designing technology for the human body.⁴¹

- **Reproduction**

Sexual activity has been at the heart of the evolutionary process as a means for reproduction to ensure continuity. However, as technology enhances our bodies and supports longevity, it undermines the need for continuity.⁴²

³⁸ Leonardi, Paul M., Jeffrey W. Treem, and Michele H. Jackson. "The Connectivity Paradox: Using Technology to both Decrease and Increase Perceptions of Distance in Distributed Work Arrangements." *Journal of Applied Communication Research*, vol. 38, no. 1, 2010, pp. 85-105.

³⁹ Duda, Igor, and Robert Kurelić. "Introduction—Identity in Flux." *Tabula: časopis Filozofskog fakulteta, Sveučilište Jurja Dobrile u Puli* 14 (2016): 1-3.

⁴⁰ Malatino, pp. 179-190.

⁴¹ Ferrando.

⁴² Ice.

Technology

- **Sex change**

Using technologies to help change one's biological sex, including reproductive organs.

Usually refers to a binary change from female to male or vice versa, but can also be done to dismiss one's sex.⁴³

- **Artificial Wombs**

Already tested successfully on humans, artificial wombs are considered a game changer by undermining the connection between femininity and pregnancy (and the gender role associated with it), allowing other biological sexes to experience pregnancy as well.⁴⁴

- **Genome Editing**

Genetic engineering in which DNA is inserted, deleted, modified or replaced in the genome of a living organism. Have the ability to overcome flaws, or change our biological sex in an easier and less interfering way.⁴⁵

- **Human cell atlas**

A comprehensive reference that maps all human cells, as a fundamental step in the journey to control body modifications or creation.⁴⁶

- **Personal robots and butlers**

Using robots as personal assistants to help with domestic work associated with feminine gendered roles.⁴⁷

⁴³ Ice.

⁴⁴ Ice.

⁴⁵ Ice.

⁴⁶ Ice.

⁴⁷ Webb, et al.

- **3D printing artificial limbs**

3D printing is being used to print artificial limbs and synthetic organs which allow us to experiment with physical changes to our bodies for medical and aesthetic purposes.⁴⁸

- **Artificial Intelligence**

Will make knowledge accessible to all populations of different socioeconomic backgrounds. Besides reducing social gaps, it can contribute to empowering females from low socioeconomic classes.⁴⁹

- **Multiple realities**

In a world of multiple realities, the definition of sex is subject to change, and so is the importance of using it as identification. Using virtual reality as a simulation can help create empathy toward others and experiment with the concept of physical change.⁵⁰

- **Nanodegrees**

Turning education into a more accessible resource, which can reduce gender gaps in countries where females are less likely to get a formal education.⁵¹

- **Sex fluidity**

Body modifications related to biological sex through the use of technology will grant us new and unusual capabilities.⁵²

⁴⁸ Ice.

⁴⁹ Webb, et al.

⁵⁰ Webb, et al.

⁵¹ *Getting To Equal How Digital Is Helping Close the Gender Gap at Work*. Accenture, 2016, *Getting To Equal How Digital Is Helping Close the Gender Gap at Work*, www.accenture.com/t00010101T000000__w__/_ar-es/_acnmedia/PDF-9/Accenture-Getting-To-Equal.pdf.

⁵² Ice.

Legal

- **Robot rights**

The philosophical and theoretical discussion about robot rights is beginning, as robots are being designed to become part of our society.⁵³

- **#Timesup**

Following the #MeToo movement, #TimesUp holds organizations accountable to treat females and other minority groups fairly.⁵⁴

- **Technology accessibility as a human right**

Promoting the agenda of technology and internet accessibility as a fundamental human right, which will also help to reduce social and gender gaps.⁵⁵

- **Biohacking agenda**

Discussions about the ethics and politics of people making changes to their bodies, and their rights to autonomy and privacy.⁵⁶

- **Ownership of DNA**

New human rights and rights of consent for the use of a person's DNA, and criminalizing the theft or unauthorized use of DNA.⁵⁷

⁵³ Ferrando.

⁵⁴ "Home." *Time's Up Now*, Time's Up, 1 Jan. 2018, www.timesupnow.com/home.

⁵⁵ *Women & Mobile: A Global Opportunity*. GSMA Development Fund, *Women & Mobile: A Global Opportunity - A study on the mobile phone gender gap in low and middle-income countries*, www.gsma.com/mobilefordevelopment/wp-content/uploads/2013/01/GSMA_Women_and_Mobile-A_Global_Opportunity.pdf.

⁵⁶ Malatino, pp. 179-190.

⁵⁷ Malatino, pp. 179-190.

Full Trend Write-Ups

Undermining the Concept of Reproduction

Trend type [Social]

Summary:

Reproduction is no longer exclusively tied to biological sex or a heterosexual relationship.

Advanced biotechnologies allow us to create and grow fetuses and sex organs in the lab.

Description:

Human evolution has been based on the primary need for reproduction and aging as mechanisms to ensure the continuity of the species. Historically, reproduction has been mainly the domain of the sexual union of male and female, or via in vitro fertilization—which still requires direct biological contributions and/or participation of males and females to some degree. Recent developments in biotechnology such as growing a vagina in a laboratory, controlling and creating sperm from skin cells, and growing embryos in artificial wombs, are taking us one step closer to being able to synthesize genitals and complete a sex change. Another breakthrough is happening in the field of 3D bioprinting, where scientists have printed artificial organs. Moreover, scientists have learned how to “program” stem cells to become different types of tissue, and are working on completing the mapping of the human atlas, which will enable complete restoration, creation, and improvement of the human body.



Figure 28: Vissian Cogenitor—a third gender in Vissian biology, whose only purpose is to complete the reproductive process⁵⁸

Signals/evidence:

- Four women have had new vaginas grown in the laboratory and implanted by doctors in the US (2014).⁵⁹
- An artificial womb designed to support critically premature babies has been demonstrated successfully in animals for the first time, in an advance that could transform the lives of the most fragile newborns (2017).⁶⁰
- Bioprinting live organs: Taking place in a lab as the first step, people will be able to print artificial organs using inkjet technology. The first printer has been in use since 2010.⁶¹

⁵⁸ Cogenitor." *Star Trek: Enterprise*, season 2, episode 22.

⁵⁹ Atlántida, Raya-Rivera M. "Tissue-Engineered Autologous Vaginal Organs in Patients: a Pilot Cohort Study." *The Lancet*, vol. 348, no. 9024, 1996, p. 347., doi:10.1016/s0140-6736(05)64983-5.

⁶⁰ Partridge, Emily A., et al. "An Extra-Uterine System to Physiologically Support the Extreme Premature Lamb." *Nature News*, Nature Publishing Group, 25 Apr. 2017, www.nature.com/articles/ncomms15112.

⁶¹ Mccann, Huk, and Lesson. "Print Your Own Designer Organs." *H+ Media*, 25 Mar. 2010, hplusmagazine.com/2010/03/23/print-your-own-designer-organs/.

- The science is now available to allow women who began life as men (transgender) to receive donated wombs and attempt to start a pregnancy.⁶²
- Scientists are learning to control stem cells to a point where it can be decided what form and type of cell they become.⁶³

Implications:

Legalization of the freedom to reproduce is gaining momentum since the World Health Organization has updated its reproductive regulations acknowledging the right to reproduction to any human from any biological sex.⁶⁴ Also, the Transhumanist Party declares in its bill of rights 2.0 “all sentient entities are entitled to reproductive freedom, including through novel means such as the creation of mind clones, print children, or benevolent artificial general intelligence.”⁶⁵ Creating a fetus in laboratory conditions will become possible due to stem cell editing and bioprinting technologies, and artificial wombs or personal robots will support them.⁶⁶ That is considered a game changer for the LGBT community, as it continues to undermine social values related to the heteronormative family structure (male and female) and female gender roles associated with pregnancy. Reproduction technologies also eliminate limitations or concerns about fertility, biological age, and interrupting one’s professional life.

⁶² “Living Human Tissue.” Organovo, organovo.com/science-technology/bioprinted-human-tissue/living-human-tissue/.

⁶³ Trafton, Anne. “Building Organs Block by Block.” MIT News, 13 May 2010, news.mit.edu/2010/tissue-legos-0513.

⁶⁴ “Reproductive Rights and Transhumanism.” H+ Media, 15 Oct. 2014, hplusmagazine.com/2014/10/15/reproductive-rights-transhumanism/.

⁶⁵ “U.S. Transhumanist Party – Official Website.” US Transhumanist Party Official Website, transhumanist-party.org/tbr-2/.

⁶⁶ Prasad, Aarathi. “How Artificial Wombs Will Change Our Ideas of Gender, Family and Equality | Aarathi Prasad.” The Guardian, Guardian News and Media, 1 May 2017, www.theguardian.com/commentisfree/2017/may/01/artificial-womb-gender-family-equality-lamb.

Extrapolations:

- A complete sex change, including reproduction organs, will be possible once the human atlas is completed.
- Reproduction will be done in laboratory conditions, with full awareness of the genome's choice, and will be possible between more than two people (possibly a group) who have a common interest and share equal responsibility for the fetus.
- As technology advances us toward eternal life, our need for reproduction will diminish, and will probably disappear or become negligible.

Countertrends:

- Strong opposition from religious and conservative institutions, leading to legislation prohibiting the processes.⁶⁷
- Restriction of federal funding for research on stem cells obtained from human embryos because the technology requires the destruction of human life.⁶⁸

⁶⁷ *Religion and transhumanism: The unknown future of human enhancement* (2015). Beaverton: Ringgold Inc. Retrieved from <http://ocadu.idm.oclc.org/login?url=https://search-proquest-com.ocadu.idm.oclc.org/docview/1651727614?accountid=12991>

⁶⁸ Murugan, Varnee. "Embryonic Stem Cell Research: A Decade of Debate from Bush to Obama." *Advances in Pediatrics.*, U.S. National Library of Medicine, Sept. 2009, www.ncbi.nlm.nih.gov/pmc/articles/PMC2744932/#idm140210164031680title.

Moving Toward Agency. How Technology of the Self can Liberate Humans from the Social Constraints of Biological Sex.

Gender Bias in Technology

Trend type [All]

Summary:

Technology is mostly shaped by white males^[11] and therefore is designed, consciously or unconsciously, based on their worldview; hence it is considered gender-biased.

This is what happened when I searched "nurse" in Google images:



This is what happened when I searched "doctor" in Google images:



This is what happened when I searched "CEO" in Google images:



Figure 29: Google Image Search Has A Gender Bias Problem⁶⁹

Description:

To create better human-machine interaction technologies that are designed based on human social and cultural values. Since white males are responsible for most of the technologies we use, they tend to develop them to fit their worldview.

⁶⁹ Cohn, Emily. "Google Image Search Has A Gender Bias Problem." *HuffPost Canada*, HuffPost Canada, 7 Dec. 2017, www.huffingtonpost.ca/entry/google-image-gender-bias_n_7036414.

Gender bias can be expressed in many ways; for example, our choice of pronouns to refer to our technologies. We tend to describe personal assistants as females by using the default feminine voice assigned. As for robots, we tend to associate them with male pronouns and voices. Google's search results assign roles based on biological sex, presenting males as doctors and females as nurses. Gender bias in technology affects not only us but also future generations, as it continues to lean on gender stereotypes and educate younger people based on those stereotypes.

Signals/evidence:

- Two prominent research image collections—including one supported by Microsoft and Facebook—display a predictable gender bias in their depiction of activities such as cooking and sports. Images of shopping and washing are linked to women, for example, while coaching and shooting are tied to men.⁷⁰
- We tend to use a masculine pronoun for robots, and a female pronoun for personal assistants and customer service bots.⁷¹
- In a series of experiments, Clifford Nass and Youngme Moon have illustrated how people tend to relate to computers in the same way they would relate to other humans, including keeping the gender stereotypes and biases intact when the robot is given a female or a male voice.⁷²

⁷⁰ Zhao, Jieyu, et al. "Men Also Like Shopping: Reducing Gender Bias Amplification Using Corpus-Level Constraints." *University of Virginia*, University of Virginia, vicenteordonez.com/files/bias.pdf.

⁷¹ Ferrando.

⁷² Ferrando.

- Artificial intelligence (AI) and machine learning are programmed with gender bias—associating women with images of kitchens, or when used to find a candidate for a position in an engineering company, dismissing female candidates as it considers this sector to be dominated by men, and therefore suggesting a male candidate as the best fit.⁷³

Implications:

When gender bias influences technology, it can pose a risk to almost every aspect of our lives, starting with our social values, economy, education and future generations. When Google search results present males as doctors and females as nurses, they unconsciously influence future generations that could grow into a reality where females are not considered suitable for leadership or key positions. Microsoft research on females in the STEM (Science, Technology, Engineering and Math) field⁷⁴ has shown that the absence of females as role models is the main reason why young females do not see their future in STEM. This vicious cycle is the hardest one to break. Without females as role models there will be no future for females in STEM; and without more young females in STEM, technology will keep experiencing technology bias. Companies and professional networks such as LinkedIn use an AI algorithm to prioritize candidates, based on their relevance to the position. When AI is affected by gender bias, it tends to prefer males over females⁷⁵, hence depriving females of equal employment

⁷³ “AI and Gender Bias – Who Watches the Watchers? | IDG Connect.” No-Images, www.idgconnect.com/blog-abstract/29037/ai-gender-bias-watches-watchers.

⁷⁴ Ibid.

⁷⁵ Day, Matt. “How LinkedIn’s Search Engine May Reflect a Gender Bias.” *The Seattle Times*, The Seattle Times Company, 8 Sept. 2016, www.seattletimes.com/business/microsoft/how-linkedins-search-engine-may-reflect-a-bias/.

opportunities. Because gender bias can also be unconscious, we sometimes tend not to give meaning to its implications, thereby running the risk of turning it into our reality.

Extrapolations:

- Machines and technologies are now the main inhibitor of inequality as they are designed with gender bias as a value. As such we become blind to gender bias as we get used to making decisions based on it.⁷⁶
- We turn into a male-led society as males control our economy, politics and STEM.

Countertrends:

- Regulations and policies supported by governments and social activists promote the anti-bias agenda to help designers and developers avoid gender bias in developing new technologies.
- Women in Tech and other social organizations set the level of urgency and raise awareness of the need for more females in STEM, and support more females taking their first steps in that industry through personal mentoring programs.

Scenario Writing

The two axes method scenarios

The first method, the two axes, is based on one of the approaches used by Shell. By placing two significant factors influencing the future of gender on each of two axes, it generates four

⁷⁶ Alba.

different scenarios, which describes the interaction between the two edges of the axes, allowing me to reflect the influence of other events and trends in addition to those represented on the two axes (Rhydderch 11-12).

The drivers I chose to use on both axes are:

- Cyborg: hybridism of technology with the human body. Includes a wide range of neurotechnology, biotechnology and reproductive technologies; and
- Postgenderism: describing the time frame between the patriarchal values to one's subjectivity (not constrained by any gender and biological sex definitions).

The results are four different scenarios describing the intersection between cyborg (body-related technology), Human, Patriarchal values, and Subjectivity (postgendered future).

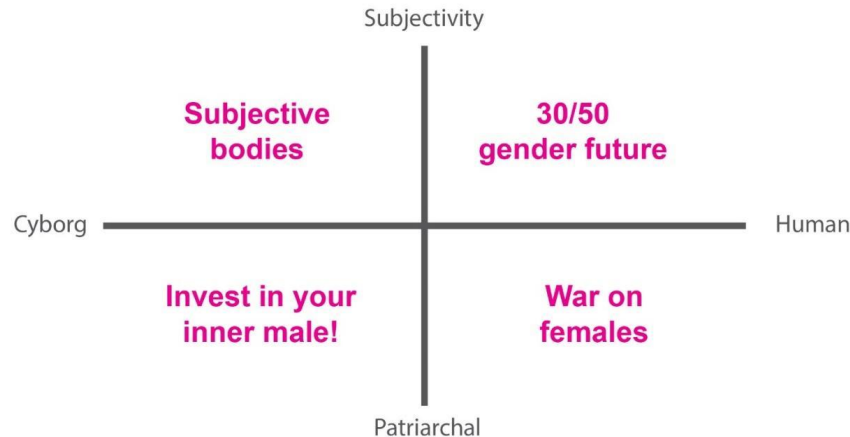


Figure 30: The Two Axes Model for Scenario Writing

The two axes method is excellent for presenting a comprehensive mapping of four different scenarios. The scenarios present a variety of possibilities moving between utopia and dystopia. I was interested in exploring the diversity of the scenarios I could come up with, created based

on the intersection of the two axes, in four points. The process itself was inspiring as it proved the sensitivity of potential changes in shaping our future. The two axes method helped with visioning the opposite future of the one I was aiming for, presented in the *What-if* question, and as such, helped with understanding the importance of the inhibitors when planning scenarios.

Subjective bodies (Cyborg, Subjectivity)

This scenario describes a posthumanism era in which our body is integrated with different body-related technologies that change the way we experience the world, and help humanity to overcome gender to a point where individuals are defined, if at all, by their actions and not by their biological sex.

The trends used in this scenario: dreams of immortality, humans playing god, gender stereotypes, tech accessibility, transhumanism (H+), identity, reproduction, biohacking agenda, ownership of DNA, tech accessibility as a human right, human cell atlas.

Humanity, as we knew it, has come to its end; the cyborg, hybridism of human and machine, has been evolving and changing many social and cultural values. The endless possibilities for body modifications, and the availability of technology, driven by the agenda of subjectivity, has made it possible for different types of life to develop, affecting not only forms of embodiment but also self-definition motivated by liberal social policies in the pursuit of eternal life and liberty.

Driven by the transhumanism agenda, beginning in 2016, our social values gradually started changing. Forty years later, the world population comprises a wide range of entities including: genetically modified humans; cyborgs; digital intelligence; intelligent enhanced species of plant or animal; hybridism of human, animal and plants; and other advanced sapient life forms such as AM (artificial minds), and ME (morphologic entities). By deconstructing and undermining the conventional structure of the physical body, we also change the parameters we use to identify entities. Definitions used in the past, such as biological sex and the associated gender roles, are no longer relevant for the majority of the entities existing today. Instead, data processing abilities and human-machine ratio are considered more common parameters to describe an entity.

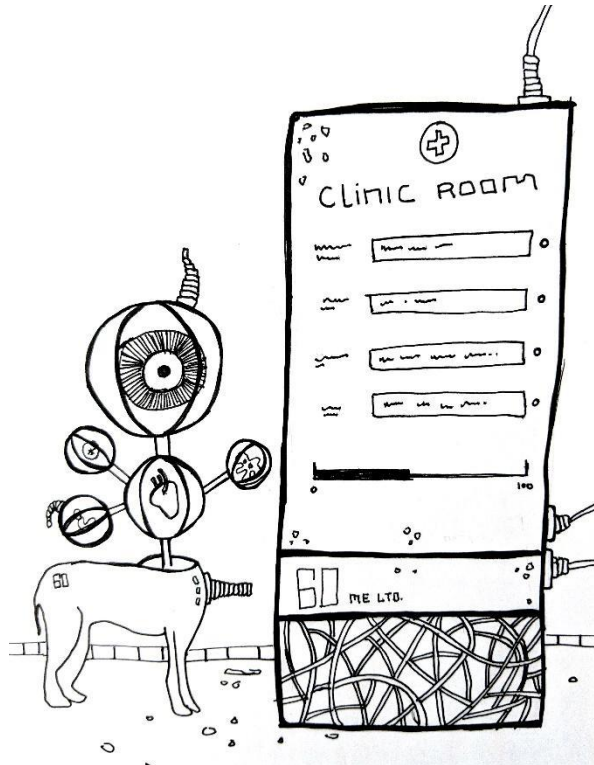


Figure 31: ME, morphologic, non-sexual, and subjective entity. ME can change its body at any given moment to adjust its needs

By 2032, we are able to overcome the risk of extinction when technology ensures us eternal life. Aging is classified as a disease, and life extension, body improvements, and other technologically driven improvements reduce the need for reproduction. After the complete mapping of the human atlas, reproduction has become entirely dependent on technology and eliminated the need for a sexual relationship as a means for reproduction. Hence, the gendered roles associated with the female and male body disappear entirely.

As a result, most of the advanced species—high-human ratio entities—choose to remove their reproductive system and sexual organs as they no longer serve any purpose. New entities are created as non-sexual, while others, defined as human-portion entities, adopt technology as an easy way to blur or dismiss their biological sex. The process can be done using a non-invasive procedure, in the comfort of their home. Using a personal scan device which contains DNA mapping, and stem cells of their body, changes of any kind can be efficiently executed based on the appearance they desire. Once the body is shaped by the individual, freely and not limited by any factor, the device completes the changes based on the amounts and types of stem cell stocks required, and the hormonal changes necessary for the procedure to be completed. The process might take up to two days.

Body-related technologies have managed to dismiss the implications of our definition of biological sex, liberate entities from the social constraints related to it, and subjectively define entities based on other parameters.

Invest in your inner male! (Cyborg, Patriarchal)

This scenario describes a posthumanism era in which our body is integrated with different technologies which are influenced by the patriarchal social norms. The technologies prioritize males over females.

The trends used in this scenario: gender stereotypes, tech obsession, gender bias, gender discrimination, gender activism, tech accessibility as a human right, human cell atlas, artificial womb, reproduction.

The technological culture we have chosen to adopt has deeply damaged the fundamental values of our society. Without realizing it, technology has changed from a tool that serves humanity to a forceful and destructive autonomy that overwrites the uniqueness of the individual and shapes it in its shadow. In an era of so many technological possibilities, our obsession with technology has pushed us to experiment with almost everything available, ignoring some of the hazards—including gender bias.

Technology has always been developed by males. In a natural process of creation, they incorporated their worldview and personal experiences into the technologies they created. As a result, gender bias has been deeply rooted in technology and everyone who uses it. However, while men were empowered by technology, females were diminished by it. In many cases, technology completely ignored females because it did not recognize them as legitimate human beings. In a gradual process, females found themselves pushed out of science, economics, politics, culture, and any field powered by technology.

In many cases, females are replaced by more efficient technological entities that play all their gender roles. Female-like robots serve as partners, mothers, and wives, taking care of all domestic matters, serving their partners submissively. Reproductive technologies such as stem cells and DNA editing provide the reproduction process in laboratory conditions, using artificial wombs that eliminate the need for females entirely.

As a result, females become a social burden. Motivated by the need to justify their existence, the new feminist agenda, following the World Health Organization (WHO), calls on females to take advantage of technology to turn themselves into thriving males to improve their social status and life. The new public agenda, "Invest in Your Inner Male," presented in the WHO brochure, promises females the possibility of a better future if they take advantage of the exclusive offer of 50% off the original procedure price, and turn themselves into males.



Figure 32: *Becoming a male*

The facts presented to them have done their job, and millions of women around the world have been pushed toward sex change by the promise of a better future.

War on females (Human, Patriarchal)

This scenario describes a reality in which humanity is founded on patriarchal values in all spheres of life, which prioritize males over females.

The trends used in this scenario: feminism, gender stereotypes, gender activism, female leadership, feminist technology, #Timeisup.

“Everywhere we look, across political, social, media, education, business, we are experiencing a shift to a female-dominated culture. The most profound conflict between males and females, the one that is tearing our society, will continue to play out for the rest of our lives, unless we will start taking action, immediately.” The words of Jonathan McFlurry, president of the conservative Renewable Patriarchal Party (RPP), were quoted in every news program and magazine. His party burst into the world at the election of 2035, began to gain momentum around the world, and attracted millions of males. “War on feminine dominance is a top priority for every male around the world,” he said at the first RPP convention. “In a future world where experts are talking about replacing men with robots, someone needs to draw a big thick line before males lose their relevance.”

The year 2029 was the Golden Age of the feminist revolution after it succeeded in making a tremendous change. Females became the power behind every major industry. The feminist revolution managed to place females on the map of leadership. The fifth wave of feminism can claim some significant changes. Females now represent almost 90 percent of all consumer spending across all categories of products and services. Women comprise over 78 percent of post-graduate classes (more than any other group in our population). And women hold more key positions than white straight males. They have managed to break the glass ceiling in workplaces, science and the economy, positioning females as managers, leading researchers, CEOs, and entrepreneurs. AI was redeveloped on a female model, a female president led the United States for eight years, and even AI recognized almost the same number of males and females for the term 'CEO.'

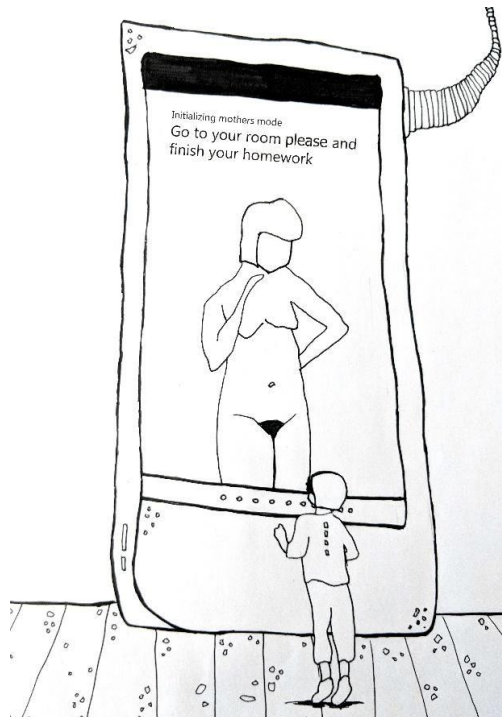


Figure 33: Initializing mother's mode ...

Indeed, only four years after feminism succeeded in instilling its values, and two years after the RPP party got elected, feminism suffered a great defeat. Perhaps it was naive to imagine humans can overcome gender. The longtime battle for social equality ended as our world is, and always will be, leaning toward patriarchal values. It is a struggle for power and social dominance that neither side is willing to give up for the right to lead the world—specially males who for so many years used to be in this position. The temporary rise of feminism was nothing but a speed bump in the long history of men controlling the world. “People care about their sex; it’s their way of defining themselves, that is what they are. So why is it any different if society needs to define people by their gender? Humanity needs definitions!” McFlurry claimed, and no one was there to argue against him.

With the increase of the RPP’s popularity, definitions for both biological sex and gender roles were formulated and released to the public as part of their world social agenda. They announced formal recognition of two biological sexes—male and female—as the only acceptable entities. The differences between males and females are the combination of social and biological factors specified in a list of parameters associated with each sex. Females have better social skills; they are not useful in physical work; they are more prone to mood swings so they can’t be trusted with any important tasks. Those are only some of the characteristics assigned to females. Their most essential function is motherhood. Males as the dominant entity have a vested interest in maintaining this status quo, with the support of the most advanced surveillance technology available for tracking and monitoring their wives.

30/50 gender future (Human, Subjectivity)

This scenario describes the interaction between humanity and subjectivity. The current prediction, based on the World Economic Forum (2017), is that we will be able to get to full gender equality within the next 100 years (in advanced countries) ⁷⁷, within the timeframe of 40, this scenario describes a middle point toward subjectivity.

The trends used in this scenario: feminism, gender activism, tech accessibility as a human right, #Timeisup, nanodegrees, female leadership, embracing zero tolerance policy.



Figure 34: Breaking the glass ceiling on the journey toward subjectivity

⁷⁷"The Global Gender Gap Report 2017." World Economic Forum, 2017, www.weforum.org/reports/the-global-gender-gap-report-2017.

We are gradually and steadily moving toward a 50/50 gender future, as gender is becoming less fixed and more fluid. Technology has been the most profound force to get us here. Humanity can be proud of its two significant achievements in social change and technology accessibility: changes in social values and the acceptance of non-traditional gender identities as the norm, which turned our society into a more tolerant one. The importance of equal access to technology gets formal recognition when the UN declares access to internet and smartphones as a fundamental human right, which opens up a world of opportunity for education, work, and financial independence for people everywhere, including in less developed countries.

Our society has become more tolerant and open-minded. Our social values have changed as we have finally accepted the fact that gender equality is a good thing for both sides. Females have learned to believe and trust themselves, are treated equally, and feel secure from any harassment, while males have learned to respect and not feel threatened by strong females, and are able to express their feelings and ask for help.

The recognition, by governments all over the world, in the Equality Tech Index (ETI) led us a big step forward. The ETI is an index used by private, public and social sectors to measure their support in an equal environment. The global commitment to such a cause encourages more and more organizations to join in and push the index as their agenda. As a result, the process of overcoming gaps in the workplace, such as payments, promotions, and recruitment opportunities got us to a place where we have more female representation in areas such as politics, the media, company boards, science, and technology development. High management

levels of public and private companies promote the agenda for gender equality and at the same time encourage males to embrace the changes.

Students are exposed to a more diverse learning experience, as our approach to education has changed and become more comprehensive. In an advanced-reality class where they can learn through practice, students learn geology with Mary Anning or take an art class with Judy Chicago, so that young females and males will grow up with the notion of equality, influenced by strong female role models. Thus, gendered stereotypes will no longer affect their life decisions.

The idea of subjectivity does not include the patriarchal feminine roles; it is free of the obligation to do so. Subjectivity offers people free choice. The idea of human subjectivity becomes more realistic, as we are gradually advancing toward a 50/50 gender future.

The VERGE method scenario

The second method, VERGE, originally developed by Dr. Richard Lum and Michele Bowman in 2004, comprises six domains of human experience: Define, Relate, Connect, Create, Consume, and Destroy. These domains can most easily be understood as questions that researchers and process participants ask about how people are experiencing the world. How do we define things? How do we relate to one another? How do we connect to each other? (Lum and Bowman)

Working with the VERGE method allowed me to explore a human-centred scenario development. It maps the world based on a human's needs and provides an opposite scenario from previous ones, making the human the driving force behind the feasibility of the future.

Trends: humans playing God, tech obsession, tech accessibility, identity, human-centered design, human cell atlas, genome editing, 3D printing artificial limbs, sex fluidity, biohacking agenda.

Define:

- Morphological freedom: The civil right of a person to either maintain or modify their own body, on their terms, through the use of technology.
- Subjectivity: Self and social definitions based on one's actions rather than on biological sex and the associated social constraints attached to it.

Relate:

- From homonormative to heteronormative: Change in family structure, sexual partners, reproduction process.
- From heteronormative to a liberal pluralism: Give up the concept of norm as a foundation of social value.

Connect:

- Body-technology: Our biological mechanism is gradually replaced by technologies, which are implemented in our body and become an integral part of who we are.

- Human-centred design: Understanding people and their needs in order to improve the interactions when designing technology for the human body.

Create:

- Control stem cells to the point that we can dictate what kind of cells they become, and what shape they will have at maturity.
- Dematerialization of the human body, to improve biological processes and human-machine connections.

Consume:

- Medical procedures: Conducted by professional doctors for empowering, medical, and aesthetic purposes.
- Self-modification materials and technologies: to have a full control over the body, and be able to implement any changes based on subjective desires.

Destroy:

- Sex fluidity: body modifications related to biological sex.
- Binary system: moving beyond the classification of sex and gender into two distinct, opposite and disconnected forms of masculine and feminine.

Scenario

The year 2029 was when the ideology of morphological freedom started to gain its popularity. The cyborgian ideology supported the freedom of individuals to modify their body, based on their free will. After so many years of being forced to act, talk and dress in a particular way, we finally had the chance to experience the world based on our

preferences. Motivated by a need for uniqueness, we wanted to express our subjectivity. Instead of changing our hair colour or expressing ourselves through fashion, we started experimenting with body modifications, curious about its potential to change not just our appearance but also our essence.

Driven by the need for excellence and our obsession with technology, we wanted to become faster, smarter, and stronger—and we were willing to embrace every technology available to enhance our human body. We replaced biological processes and organs with synthetic organs and technological alternatives that can last forever and are easily modified. At early stages, procedures were conducted in specialized clinics, treating diseases and performing cosmetic changes. After being inundated with examples of how beneficial technology is to who we are, we got caught in an endless loop of self-modifications, experimenting with more radical changes in our body structure—this time performing changes on our own, removing and adding organs based on our free will, while technology protected us from any risk of self-harm.

The need for social change, our curiosity, and the desire to excel pushed us so far beyond our abilities that we forgot to stop and think about the implications for our self-identity, or sense of belonging, which are both integral parts of our human essence. Technological modifications have now become hot topics for public debate.

Appendix B: Prototyping

Early Stages of Prototyping: graphic novel and a game sketch

The first version of the prototype was created as a final project for my Possible Future class.

The assignment was framed under the title “From the Future: design fiction outcome” and was pretty much open to any personal interpretation. While researching for inspiration for this project online, I came across an interesting article: “Why You Need A Futurist,” written by James Wallman. Through this article I was first introduced to the world of foresight.

The process started with online research. I worked systematically, using mind mapping, a creative technique, to identify current gender issues. I mapped potential technologies that could help resolve these issues, and how they might work. I used the environmental mapping framework he used for his forecasts: DAS STEEPLE. The DAS STEEPLE framework is inspired by Michael Porter’s PEST analysis — of political, economic, social, and technological factors. It covers many aspects of our lives and can be a useful way to use futurism in social, environmental and economic areas (Wallman). DAS STEEPLE is an acronym for the list of suggested topics that can be explored to reflect current trends.

D — demographics: longer lives, aging populations, more people

A — aesthetics: our changing perception of what is/isn’t beautiful, useful, and usable

S — science: as discoveries change our attitudes and behaviours

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S — socio-cultural: our attitudes, aspirations, dreams, behaviours

T — technological: arguably the most important driver of change in the twenty-first century

E — economics

E — environment: the time bomb in any conversation about human behavior in the twenty-first century

P — political: how we act as groups and get on with others

L — legal: as laws can speed up/slow down change

E — ethics: social norms and beliefs

I acknowledge that the first version of the prototype was a naïve, unconscious version of the final product, which was missing the academic rigor aspect. Nonetheless, the outcome presented something very intriguing that prompted me to explore this topic more thoroughly. The project was not based on a methodological process of foresight and as such it is missing the acknowledgment of time (duration of the scenarios), definitions (what technologies I am using and why), credibility (it was created based on brief research, using non-academic sources), and scoping (what frameworks or methods I am using for the scenarios).

The outcome was a ten-page web-based graphic novel, reflecting on how technology might help reduce gaps between gender. The novel pairs short texts, selected parts of the scenarios, with original artwork to help to envision the main ideas of the content. The goal was to explore the

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effect of future scenarios on readers, and learn about the tension created between illustrations and text as part of the format.

The feedback I got was very supportive; however, during the process, I felt many times that my lack of knowledge and tools were holding me back. I found that the illustrations were very meaningful to my work and that people found it easier to engage with my work through the illustrations. I also realized that the ‘consider’ text I added at the end was successfully helping to start conversation between readers—which is a good takeaway for next iterations.



Figure 35: Illustrations

Version two of the prototype is a mature and conscious version of the product. The second prototype was created as part of the Media Lab Prototyping course. I focused on creating a digital version of the graphic novel to enhance the engagement of the game players with the future scenario.

I created a simple game sketch using Twine—a program for creating interactive, non-linear stories—to make a sample of a speculative future scenario I created and turn it into an interactive narrative.

During the summer semester, I acquire the desired knowledge in independent studies of foresight. It gave me the tools to create an orderly process of horizontal scanning, which includes mapping trends and drivers and writing scenarios based on different methods. The goal was to then transform these scenarios into narratives for the interactive novel.

The narrative focused on the need for reproduction, considering the fact humanity is no longer at risk of extinction due to immortality and the fact that asexual reproduction alternatives, such as creating life under laboratory conditions, cloning, or using third-sex robots designed for this purpose exist to fulfill that need. The narrative invited the game players to reflect on related subjects, such as parameters for choosing a partner (now that reproduction is asexual), considering whether reproduction is needed at all, and how it might affect other parts of their lives. Some screens included illustrations taken from the graphic novel.

The process started by creating a diagram of the user flow and testing the connection between the screens. Mapping the user flow provided me with the structure for the content as it helped me organize the screens by topic and the decisions users would need to make to advance the game.

After mapping the flow, I had to edit the text of the scenario based on these parameters:

- Identify the action unique to each screen.
- Edit the content to suit the tone and second-person perspective I chose to use.
- Expand the text for each screen to add more details that will help build a story around the action.

Turning the scenario into the narrative was the most complicated part of my work. The challenges I had to deal with included choosing how and when to break the narrative into different screens; deciding on the actions I wanted the game players to take; the tone of voice to use and whether to use first- or third-person; and how much text to include on each screen. Some of these questions were answered during the peer review process.

Peer review was conducted as part of the final presentation of the prototype during the workshop. I collected feedback from three game players. Two of them were familiar with my previous prototype, which helped me with getting additional feedback regarding the change of the format. As a side note to my peer review, I acknowledge that based on my early acquaintance with the game players they all identified themselves as heterosexual women, and

that future feedback should include a more diverse group of different sexes and gender identities.

I summarised the notes to main takeaways that should help me improve the next version of the prototype:

- Terminology and text: might be confusing for people who are not native English speakers and/or don't have an understanding of gender-related terminology. I should find a way to explain the terminology or balance it by simplifying the text.
- The amount of text: Most of the screens included two paragraphs of three sentences each. It was enough to provide information; it doesn't need to be longer than it is now.
- Personal reflection: On their first interaction with the prototype, all the game players followed the narrative that more closely described their current personal situation in life.
- Add more illustration: Illustration helped them with visualizing and building the world. They all found the screens with illustrations to be much more inviting and helpful to process the information.
- The prototype was too short: game players wanted to explore more scenarios. They were curious to see how it will continue to develop.
- The fact that it is a "real" possible scenario helped them to accept the "reality" presented in front of them.
- Work on the opening paragraph of the scenario to better explain the idea of separating sexual relationship from reproduction (concept).

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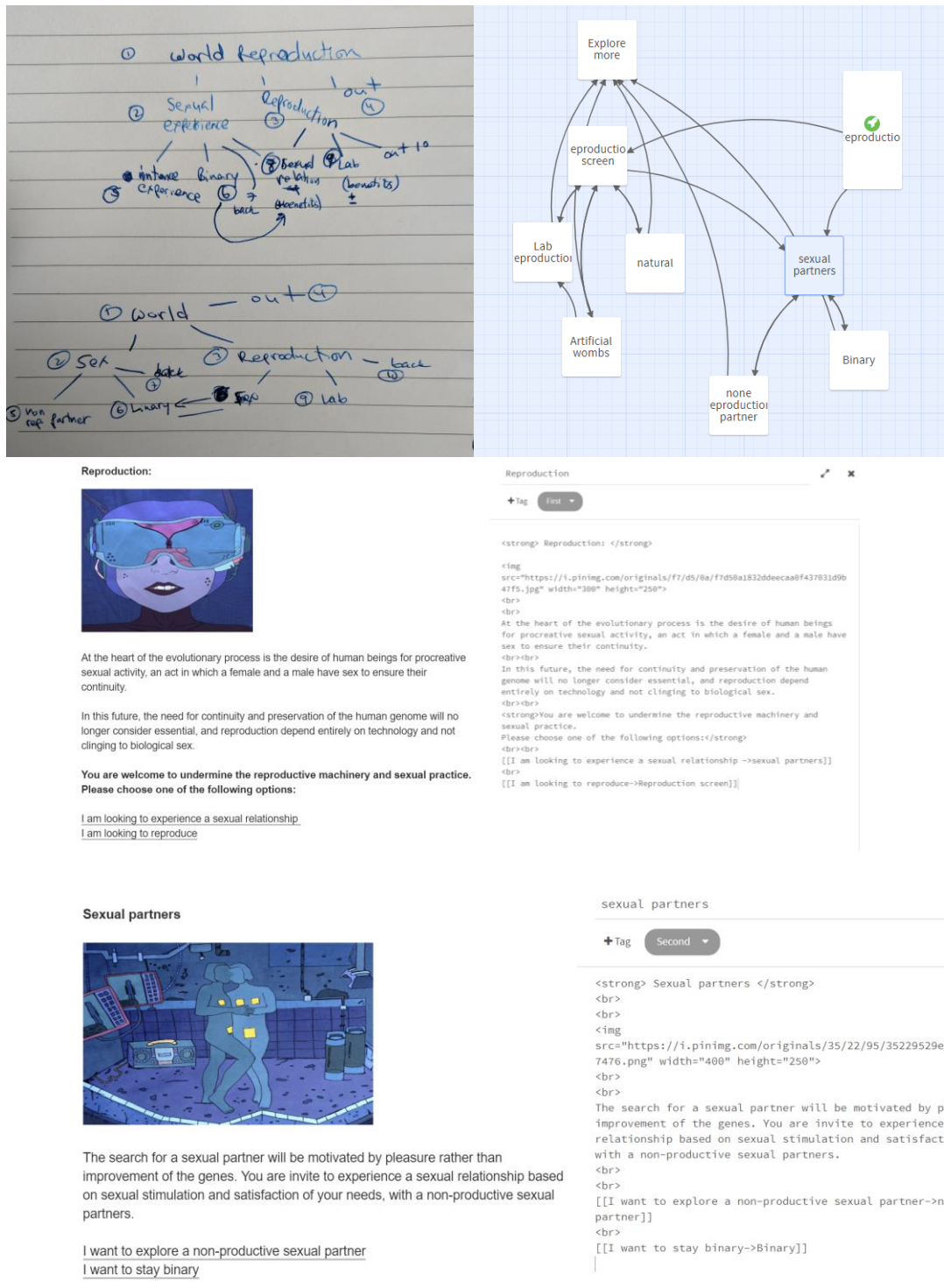


Figure 36: Game sketch

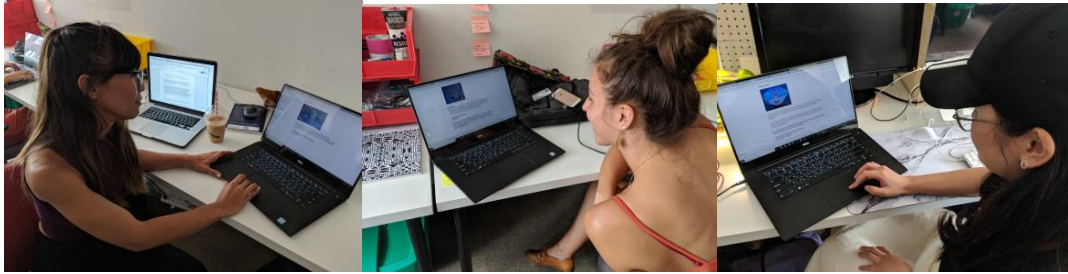


Figure 37: Peer review

I acknowledge that my conclusions are based on feedback I collected from only women who identify themselves as heterosexual; therefore, the results may not broadly reflect the impression of game players of other sex and gender identity, and I should examine the narrative with a more diverse group of people.

Using a fiction narrative that, to some extent, has a hold in reality helped game players identify themselves in the story. They found the timeline I chose to be reasonable and not too far for them to acknowledge it as part of their potential future.

In this version of the prototype, I focused on the platform and the narrative. Based on peer review I noticed that game players were using the scenarios to explore life situations that were relevant to them. They used it as a self-reflection tool which they found encouraged further thinking about social norms, which was one of my goals for this project.

Crafting the narrative required most of the time spent on this prototype, and it was a very challenging process. The feedback I got was that the narrative was intuitive, but that I should consider using less complicated terminology or find a way to explain it more clearly.

The illustrations helped game players envision the narrative, which made it more accessible for them.

My future work will focus on developing my prototype on these three levels:

- Narrative: Research how to write and develop nonlinear narratives.
- Peer review: Recruit a more diverse group of game players.
- Twine (platform): Improve my skills with this tool to get better results.

For my next iteration, I aim to create one piece of the narrative, in Twine, and develop the story and illustrations in a way that it will allow me to test a new version that is closer to what I imagine the final product will look like.

Third iteration: narrative writing process

Here I focused on two aspects related to the construction of the narrative, the architecture and script of a story, and the building of the code through the interface of Twine, an interactive narrative tool.

Prior to the work, my research included experimenting with several interactive novels such as Genderwrecked, Swallow, Knife Sisters, and He Beat Her. I also participated in a workshop to expand my knowledge on how to approach narrative writing.

The process included six steps. First, I mapped the structure of the narrative. I created a Branch and Bottleneck structure high-level map. I chose this structure based on the decisions I asked the game player to take and the points at which the narrative branches and circles back, and since it is suitable for a nonlinear narrative.

In the second step, I added basic text expressing the main idea, which helped to test the narrative flow. At this point I made several changes to the structure of the story, fixing ending points in the plot and making sure there was a logical flow between screens.

In third step, I focused on the writing. At this point I had to define a few parameters such as identities of the narrator and game player, reasons why and where this game takes place. These parameters evolved along the way as part of the process of trying different approaches and tones.

- I chose to use second person point of view, using *you* as a pronoun, due to its gender neutrality. The main character in the game has no distinctive biological sex or gender identity.
- Because of the importance of placing the player in a decision-making role, using the second person puts the game player in the shoes of the character. A first-person perspective would have put the player in a passive role.
- For the narrator, I chose to use the voice of the protocol as the inner voice of the NE. The backup story, which was added to the narrative later, was that due to a temporary loss of memory as a result of the upgrade, NEs needed guides to adjust to their new

world. The protocol is a form of advanced AI and as such, I chose to use a tone of wit and sophistication for its voice.

In the fourth step, I created the first sketch of the interactive narrative in Twine. Although Twine is a fairly easy format to use, I wanted to adapt the basic settings, which requires some code editing. I used Twine's Harlowe story format documentation and forum for support in order to get the results I wanted. The goal was to create a version of the game that I could experiment with without worrying too much about the aesthetics.

After I tested the narrative a few times, playing different scenarios, I took notes on the structure and wording. Then, I improved the script by tightening word choices, adding screens where I felt that the text was too long, and making sure all references in the story followed the logic of the storyline.